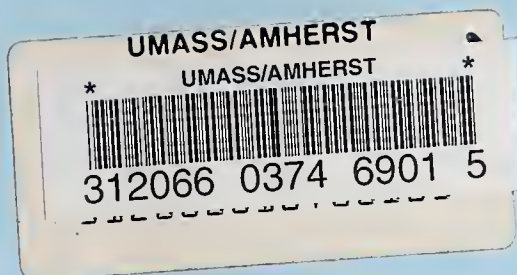


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**THE MASSACHUSETTS
SOLID WASTE MASTER PLAN:**

**"TOWARD A SYSTEM OF
INTEGRATED
SOLID WASTE MANAGEMENT"**

SECOND DRAFT PREPARED BY:

**COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
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DIVISION OF SOLID WASTE MANAGEMENT**

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Chapter 1. INTRODUCTION AND EXECUTIVE SUMMARY

This plan brings to its readers a more complete understanding of the Commonwealth's solid waste management practices and trends than has ever been articulated. It also presents a goal--to establish an integrated solid waste management system.

Integrated solid waste management treats solid waste as a heterogeneous, not homogenous, substance. This allows for the most efficient and economic management of each component of the waste stream.

Meeting the challenge of constructing this system requires new directions and initiative. This plan describes a system of integrated solid waste management first introduced as state policy by Governor Dukakis in 1985. It proposes to tap the growing multi-community efforts to plan integrated solid waste management solutions in every region of the state, and to promote, to the maximum extent possible, substantial state funding to implement these solutions. It requires that the Commonwealth:

- o reduce the amount of waste produced (particularly that which is toxic, either in production or disposal);
- o recycle (including compost) appropriate components of the waste stream;
- o combust the balance of the waste stream which cannot be reduced or recycled, but which can be safely combusted; and,
- o landfill only those wastes which cannot reasonably be reduced, recycled, or burned.

In keeping with integrated solid waste management, this plan projects that all of the Commonwealth's trash will be processed --through recycling, composting and combustion-- by the year 2000. Direct disposal of municipal solid waste (MSW) at landfills will be phased out. Instead, landfills will be used exclusively for disposal of bypass and residue from waste processing facilities, and for those wastes which cannot first be safely processed.

The plan describes ways in which this system is being brought into place. Transition is occurring: from municipal to

regional scale planning and management; from public to private ownership; and, from environmentally threatening to the preferred, somewhat benign waste processing technologies. It represents the system as being managed by three forces: the private sector, municipalities and the state. It focuses on an overarching tension; the political will exists to build this system and, indeed much progress has been made. Still, many obstacles exist to achieving this goal.

The state's management tools are policy and regulation, financial assistance, and legislation. To a large extent, these tools, except for financial assistance, are constrained by Proposition 2 1/2, a law which likely puts financial responsibility on the state for environmental protection measures instituted after 1981. The plan dedicates the state to making best use of all of its tools in order to construct the integrated solid waste management system. It commits the state to movement, regardless of the outcome of the pending law case, Town of Norfolk v. Commissioner of Environmental Quality Engineering, which may clarify the state's fiscal liability for establishing the improved standards necessary to integrated solid waste management.

Municipalities also suffer from the property tax limitations of Proposition 2 1/2. Increasingly they cannot afford to construct, manage, or properly close solid waste facilities. They have literally abandoned solid waste management in the last decade, leaving landfills without proper capping and, as a result, the quality of today's drinking water is threatened by yesterday's trash.

Resource recovery has presented itself as an attractive alternative to relieve immediate pains. To a host community, it brings significant revenue. To a contracting community, it means a twenty year commitment to disposal capacity and fixed costs. Today, almost half of the Commonwealth's solid waste is combusted. Resource recovery eases some pain, but it does not solve our problems or allow the state to realize its integrated solid waste management goal. The Plan commits the DEP to refrain from issuing permits for resource recovery facilities during the burn reassessment period, initiated with the release of the first draft of the plan, while it examines the role of combustion in future solid waste management systems.

The biggest of the public's solid waste management challenges -- establishing recycling as the favored waste processing alternative -- is ill affected by the trend towards resource recovery. Until the state can put the proper incentives in place, the private sector will continue to move toward recycling with reluctance. Today we suffer with the legacy of a failed vision of constructing a network of regional recycling facilities by 1992. Collection of recyclables remains a significant challenge for the public and private sector alike. And, markets for recyclables are uneven. This report is

sensitive to the obstacles facing the waste industry in expanding into recycling. It commits the administration to acting responsibly to accommodate their needs.

While this plan describes in detail long-term plans for building an integrated solid waste management system, it also prescribes immediate action to address the Commonwealth's solid waste needs:

- o DEP is working with the Solid Waste Commission and the legislature to establish source reduction initiatives which will reduce the Commonwealth's current waste generation by at least 10% by the year 2000.
- o The Commonwealth will establish recycling as an integral component of solid waste management. DEP will spend \$60.5 million to develop materials recovery facilities (serving western Massachusetts, Cambridge area communities, and Boston), and to assist communities in either procuring private services or in constructing their own recycling and composting facilities, resulting ultimately in a network of such facilities throughout the state. To date DEP has spent \$11 million on the Springfield Materials Recovery Facility Project. When it starts operating in January 1990, it will serve over 700,000 Massachusetts residents. DEP has initiated an extensive market development program to attract industrial users of recyclables to the Commonwealth. Development activities will establish viable means to recycle plastics and to compost the organic component of MSW including sludge, agricultural and industrial waste.
- o The Department has obligated approximately \$637,000 dollars to 21 municipalities to cover the capital costs for leaf composting projects, and another \$301,000 to 5 cities and towns for regional scale municipal solid waste composting feasibility and planning studies. These studies will describe the viability of processing the organic component of the solid waste stream. As this component often comprises 60% or more of the solid waste stream, this alternative for waste processing will be very attractive to many communities.
- o While the Master Plan is under development, DEP is not issuing operating permits to solid waste combustion facilities. During this time the Department is assessing the need for, and characteristics of, the many current waste combustion proposals. If the Department resumes permitting of combustion facilities, it will permit only those facilities where there is a need for new capacity and whose proposals represent the maximum possible recycling and reduction of waste.

- o DEP is committing staff and financial resources to those communities forming regional disposal strategies. Regional efforts are already underway in such communities and regions as Sturbridge, Shirley, Lancaster, The Merrimack Valley, Millis, Northern Middlesex County, Martha's Vineyard, New Bedford/Dartmouth, Berkshire County, Franklin County, and Hampshire County. Regional entities whose solid waste plans reflect the objectives of this document will receive preference in financial assistance available through Ch. 584 of the Acts of 1987.
- o DEP, with the assistance of its advisory committees and the commitment of extensive technical and financial resources, has drafted new facility regulations for landfills, waste-to-energy facilities, and transfer stations. These will be promulgated before the completion of this plan in December, 1989.
- o DEP will reduce illegal dumping of waste through the use of the newly created Environmental Crime Strike Force, and through cooperative initiatives with the Attorney General, local authorities, and district attorneys.
- o A comprehensive assessment program is identifying contamination problems at the Commonwealth's active and inactive landfills. Within five years, remediation will be underway or complete at all facilities posing high risk to actual and potential public drinking water supplies. To date, the Department has performed a preliminary assessment of approximately 40 landfills across the Commonwealth, has begun extensive assessment work at 6 landfill sites, and have initiated closure of 2 other landfills which are known to threaten groundwater or public health.

Summary of the Plan

Chapter 2 summarizes current waste handling across the state and projects trends to the year 2000. Municipal solid waste (MSW) is composed of residential (48%) and commercial (52%) waste streams. It generally contains large amounts of paper (almost 40%) and leaf and yard waste (almost 18%). It also contains metals, glass, food wastes and plastics.

Massachusetts citizens currently generate 6.6 million tons of municipal solid waste each year. Without waste reduction measures, this is expected to grow to 7.2 million tons by the year 2000.

DEP's projections suggest that, even with the recycling described below, a reduction in waste generation by 10%, and aggressive construction of recycling and composting facilities, Massachusetts will experience a capacity shortfall of approximately 350,000 tons per year by the year 2000. In order

to meet these projected solid waste capacity needs the Commonwealth must exceed the waste diversion goals established in this plan or revert to construction of the more traditional waste handling methods of combustion and landfill. Further progress toward an integrated system in the next few years will determine the ultimate profile of technologies in use at the end of this century.

Today 7% of the municipal solid waste stream is recycled through the Bottle Bill and local recycling programs. One hundred twenty-nine Bay State communities are recycling, approximately 70 have composting programs, and over 80 have passed mandatory ordinances in anticipation of developing materials recovery facilities (MRFs) in their areas. By the year 2000, it is projected that all Massachusetts communities will be recycling and composting, and that these technologies will handle nearly 40% of the municipal solid waste stream.

Nearly 31% of the MSW stream was combusted in 1988 at existing facilities in the Bay State. Capital costs for waste-to-energy facilities average more than \$150 million for a 1,500 ton-per-day regional facility, resulting in tipping fees averaging \$45 per ton for communities with a long-term contract, and \$75 per ton for disposal on the spot market. In 1989, two additional facilities will come on line, bringing the total permitted level for waste combustion to nearly 50%. All of these facilities are expected to be operating at full efficiency in the year 2000.

It is expected that due to capacity and water contamination problems, most of today's municipal landfills will be forced to close by 1996. It is a goal of the plan to replace the number of Massachusetts local landfills with fewer, regional facilities, and to transform use of the disposal option by the year 2000.

Municipal solid waste is the largest single component of the solid waste stream. In addition, there are difficult-to-dispose-of (or problem) wastes which are best handled separately from MSW. They include sludge, demolition and construction debris, infectious wastes, white goods, tires, waste-oil, household hazardous waste, and asbestos.

Chapter 3 describes the roles and responsibilities of municipalities, the private sector and state government in shaping environmental policy. The successful implementation of an integrated solid waste management system relies upon the commitment and participation of all three segments of the population.

This plan recommends that municipal responsibilities be exercised through a series of regional entities. It describes methods for solid waste planners to evaluate their communities'

solid waste disposal needs and options and it describes programs of state financial and technical assistance to help communities attain their goals.

This chapter of the plan describes recommended changes in the MEPA process and actual changes in solid waste regulations which engage the private sector in the state's integrated solid waste management strategy.

And, finally, the state, through the administrative, executive and judicial branches, sets public policy through regulation, legislation and arbitration, and financing. This section of the plan describes all three activities.

Chapter 4 describes trends, problems and programs across the state.

The Central Region is comprised of 80 communities and relies primarily on landfilling for MSW disposal. Recently though, more and more communities have signed contracts with waste combustion facilities. Of the proposals to construct new combustion facilities in the region, two have been site-assigned and are in the MEPA process. There has also been an upsurge in composting and recycling initiatives. Composting efforts have doubled since 1987. And, many groups of communities are working to site large recycling centers in their areas.

The Northeast Region is comprised of 95 communities and sent nearly 1.5 million tons of MSW to out-of-region processing and disposal facilities in 1988. In region, 36% of the total MSW generated is combusted and 13% is landfilled. Even though many communities have relatively long-term contracts for MSW processing and disposal, recycling and composting are gaining in popularity. The state's second MRF will service the Cambridge area communities. In addition, the City of Boston has completed a comprehensive assessment of its waste management options. It plans to construct a recycling center and implementation plans are currently being developed. Over 25 communities in the region are composting their leaves and yard wastes. There are several private agricultural composting projects in the region as well.

The Southeast Region comprises 75 communities. It relies primarily on landfilling and it is today a net importer of solid waste. The waste processing and disposal facility at Rochester, SEMASS, will change this profile dramatically when it begins full operations. Of particular significance is the impact it will have on municipal landfills: once SEMASS is fully operational, reliance on municipal landfills will decrease by 26%. The SEMASS proposal to construct a large recycling facility puts the region well on its way to achieving high levels of recycling. In addition, there are many composting programs underway. Finally, in 1990 Nantucket will construct a

MSW composting facility, the first of its kind in the state.

The Western Region comprises 101 communities and is host to the first state MRF, in Springfield. Communities in this region show strong support for recycling and composting. Currently 89 communities rely on landfills, the majority of which are expected to close within the next three years. The pressure to find alternative capacity has resulted in a pooling of resources. For instance, 12 existing landfills currently accept waste from at least one other community. Also nearly all of the region's communities are involved in regional solid waste management planning.

Chapter 5 presents a discussion of solid waste-related regulations and Department policies, and characterizes the status of each component of integrated solid waste management.

In order to achieve 10% reduction in waste generation by the year 2000, the plan calls for reallocation of resources, changes in manufacturing, and packaging designs and changes in consumer behavior. Packaging Tax programs and deposits for such items as tires and automobile batteries are legislative waste reduction options currently under consideration. Passage of these and related initiatives are critical to the state meeting desired source reduction levels.

This chapter describes these steps which DEP is taking to develop recycling and composting in the Commonwealth:

- o Establishment of a network of public and private regional recycling facilities;
- o Market development;
- o An aggressive plastics recycling program; and
- o Appropriate regulation of recycling and compost facilities.

Today there are eight solid waste combustion facilities on-line in Massachusetts. These facilities, along with two nearing completion, have increased disposal capacity dramatically. Collectively, these facilities provide approximately 140 of Massachusetts cities and towns with the comfort of a long term disposal option. Unfortunately, this arrangement also works as a disincentive to shift into the more benign waste management practices (separate collection of problem wastes, recycling and composting). They effectively discouraging development of reuse and recycling programs. Because of this the DEP is reviewing its options for ensuring the proper role solid waste combustion will play in the years ahead.

DEP is driving the transition from landfilling of municipal solid waste to other forms of solid waste processing in order to protect the Commonwealth's water supply. Two programs are critical to this objective:

- o The DEP has identified the half-mile radius surrounding a public well, or "zone II" - if defined, as the area through which must be protected from contaminants. It is DEP's intention to prohibit the siting of new landfills, phase out existing landfills, and restrict the siting of other solid waste processing facilities such as recycling facilities, transfer stations and/or combustion facilities, in this zone.
- o DEP has identified 38 landfills that already may be threatening the quality of public water supplies; these 38 will receive priority consideration for assessment and clean-up/closure grants. The agency will conduct environmental assessments at all 700 remaining landfills, and will award grants and loans to municipalities whose facilities require further assessment or remediation.

Chapter 6 discusses the state program for management of difficult-to-dispose-of wastes. These include: asbestos, construction and demolition debris, household hazardous waste, infectious waste, sludge, street sweepings, tires, white goods, automobiles, and wood waste.

Chapter 7 summarizes the key elements of the plan and identifies the questions the Commonwealth faces in preparing a plan for solid waste management in the 21st century.

Chapter 2. SOLID WASTE GENERATION, PROCESSING, AND DISPOSAL CAPACITY: DIRECTIONS AND TRENDS

Integrated Solid Waste Management

An integrated solid waste management system processes and disposes the various components of the waste stream in the most environmentally sound manner. It is based on a priority of practices endorsed by the Massachusetts Legislature and environmentally concerned citizens across the Commonwealth. It prescribes waste management based upon the following hierarchy:

- o reduce the amount of waste produced (particularly that which is toxic either in production or disposal);
- o recycle and/or compost appropriate components of the waste stream;
- o combust the balance of the waste stream which cannot be reduced or recycled, but which can be safely incinerated; and
- o landfill only those wastes which cannot reasonably be reduced, recycled, or burned.

One objective in adopting this system is to phase out landfill disposal to the maximum possible extent. For municipal solid waste, this means building processing facilities which ultimately can accommodate the full tonnage generated. DEP estimates this can be accomplished by the year 2000. At that time, landfills will accept only bypass and residue from MSW processing facilities and those difficult-to-dispose-of wastes which cannot be recycled or safely combusted.

Integrated solid waste management benefits both the environment and the economy. Waste reduction and recycling practices limit the variety and volume of materials requiring combustion and/or disposal. Thus, the entire cycle of resource use--from extraction of raw materials and energy, to materials processing, manufacturing, and transportation--is altered to lessen adverse environmental impact. In addition, the disposal of fewer, less toxic wastes reduces the potential for surface and groundwater contamination and diminishes the rate at which land is consumed for disposal.

Secondly, integrated management is cost effective. When life-cycle costs of solid waste processing and disposal facilities are calculated, it becomes evident that an integrated system is preferable. Recycling (at \$0-\$35¹ per ton) and leaf and yard waste composting (at \$10-\$20 per ton), even with today's uneven market for their products, are less costly per ton of MSW processed than combustion (\$25-\$70 per ton) or landfilling (\$25-\$65 per ton). Additionally, landfill disposal costs for inert materials, such as the residue from waste processing facilities, are less than those for disposal of standard MSW. Finally, diversification of waste handling is an appealing investment strategy. Should one component be found faulty, its repair or replacement will have minimal impact on the management capacity of the whole system.

The History of Solid Waste Management in Massachusetts

From the 1700's until the mid-1950's, the Commonwealth relied on open burning and/or dumping for solid waste disposal. Until 1970, open burning was considered by many to be a simple and effective method for reducing the amount of waste buried. However, the Massachusetts Air Pollution Control Regulations of 1970 recognized the environmental threat related to uncontrolled burning of solid waste and prohibited it in most forms. Relatively crude incinerators were constructed to replace open burning, but they were soon found to be polluting as well. Consequently, Massachusetts communities reverted to their reliance on landfills.

Even as the shift back to nearly total landfill dependence for MSW disposal was taking place, the engineering profession and environmental community understood the fault of this transition. Landfill regulations issued in 1971 distinguished between sanitary landfills and dumps. Dumps were forced to close or radically improve their operations. Once again, landfill disposal faced considerable criticism. With this wave of concern about landfilling came a willingness to invest in new technologies. Thus, in 1975, Saugus became host to the first resource recovery facility in the nation.

Even today the full extent of surface and ground water contamination due to landfills is unknown. Technical and financial resources for adequate assessment are only recently available. According to the best current data, at least 80, or approximately 40%, of the state's active landfills threaten to pollute, or are polluting, surface and ground waters.

¹ All prices are 1988 figures from Massachusetts facilities and are exclusive of collection costs.

This frightening statistic, first revealed in the Bureau of Solid Waste's 1984 Active Landfill Report, was a catalyst in changing the direction of solid waste management in the state. The report, along with research and policy initiatives, was reviewed by representatives from the waste disposal industry, recycling community, municipal officials, and environmental groups. They came to one conclusion which influenced all subsequent recommendations: total reliance on either single-community landfills or planned resource recovery facilities was rejected. Instead, favor was given to integrated solid waste management. This became the central philosophy of Governor Dukakis's 1985 Solid Waste Plan. The Plan had three objectives:

- o recycle and reduce the municipal solid waste stream by up to one-third;
- o enhance resource recovery capacity (projections indicated that resource recovery could account for the disposal of one half of the Commonwealth's waste by 1995); and
- o dispose the rest of the waste stream at environmentally sound, regional landfills.

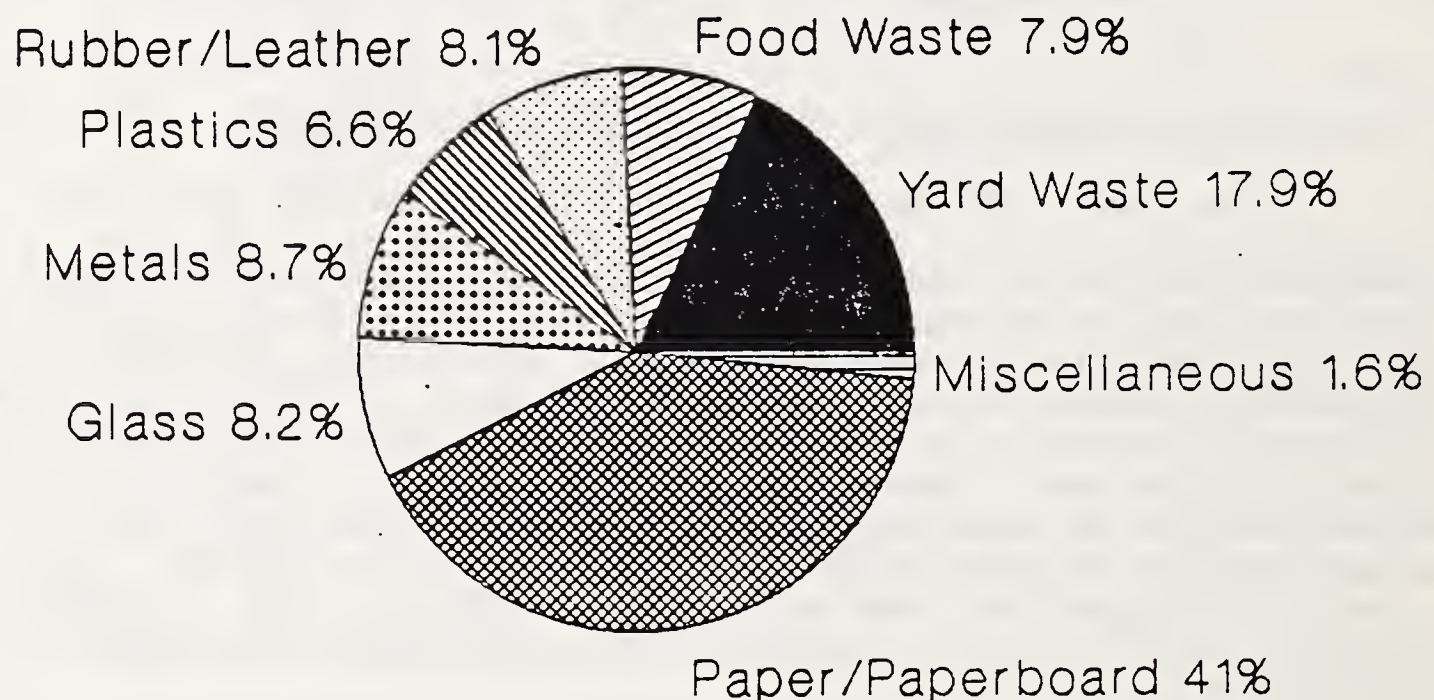
Profile of Massachusetts Solid Waste Generation

This year, the Commonwealth will generate approximately 10 million tons of solid waste, more than 6.6 million tons of which is municipal solid waste (MSW), largely comprised of paper, leaf and yard wastes, metals, glass, food wastes, and plastics. MSW includes residential and commercial waste streams. The residential waste stream accounts for 51% of MSW while the commercial waste stream (generated by institutions and business) accounts for 49%². The remaining 3.4 million tons of solid waste include industrial wastes, sludge, demolition and construction debris, used appliances or white goods, tires, waste oil, asbestos, and other solid wastes which require special handling in collection and processing or disposal at special facilities.

²For more information on the specifics of these calculations, please refer to Appendix 2.

Today, waste processing and disposal costs in Massachusetts are comparable to those in other industrialized states. Three factors drive this. First, greater technical and scientific understanding of the problems associated with improper solid waste management has necessitated more pollution controls. Landfills are now constructed and operated to minimize the threat to groundwater. They are built with a base of multiple liners and are equipped with leachate collection and treatment systems, methane collection systems, and groundwater monitoring systems. Today's estimated construction cost of a 20-acre landfill system is \$2,500,000, and the cost of waste disposal at such landfills can be expected to average \$45 per ton. Second, land costs in Massachusetts are extremely high relative to other states. Third, the distribution of solid waste facilities is irregular. Communities in the Northeast and Central regions are likely to pay higher disposal costs because they have less available disposal capacity. Thus their disposal costs include higher transportation costs.

Table 2 - a
Municipal Solid Waste Composition



Source: 1986 EPA Report on Solid Waste

Many Massachusetts communities have started one or more of the component programs which make up an integrated solid waste management system. Currently, 7% of the MSW stream is recycled

through the Bottle Bill, other recycling and composting programs. One hundred twenty-one Bay State communities are recycling, nearly 61 have composting programs, and over 80 have passed mandatory recycling ordinances in anticipation of developing materials recycling facilities (MRFs).

Solid waste combustion is a popular option. There are now 6 waste-to-energy facilities and 2 municipal incinerators serving 152 communities. Capital costs for waste-to-energy facilities average more than \$150 million for a 1,500 ton-per-day regional facility, resulting in tipping fees averaging \$45 per ton for communities with long-term contracts, and \$75 per ton for disposal on the spot market.

Table 2 - b
Average Disposal Cost/Ton Index

<u>Region</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Northeastern	\$42.50	\$69.00	\$60.00
Southeastern	\$44.00	\$64.00	\$58.00
Central	\$48.00	\$73.00	\$59.00
Western	\$38.00	\$58.00	\$53.00

Massachusetts relies largely on landfills to dispose residential and commercial solid waste. It is only in the last fifteen years that the alternative of processing solid waste has become practicable. Over the same period large-scale regional landfills have replaced many local landfills. As Figure 2 - c indicates, the Commonwealth is experiencing a sharp decline in both the numbers of active landfills and the proportion of MSW they are permitted to dispose.

Table 2 - c
Landfill Disposal Rate

	<u>1985</u>	<u>1988</u>	<u>1992*</u>
<u># of Landfills</u>	203	194	43
<u>MSW Disposed</u>	67%	63%	22%

* Projected

Today, many existing municipal landfills are reaching their permitted capacity. Of the 194 active landfills in Massachusetts, only 28 are constructed with liners. The

remaining 166 are older, unprotected facilities nearing capacity. One hundred fifty-one of these older sites are expected to close by 1992.

Difficult-to-Dispose-Of Wastes

Based on current understanding of toxic components of the waste stream, and given the fact that safe processing and disposal today is less expensive than clean-up of improper sites tomorrow, the state is acting aggressively to improve handling of certain wastes, such as tires, sludge, asbestos, household hazardous waste, infectious wastes, household appliances (known as white goods), and construction and demolition debris. Problem wastes typically require special handling before disposal and designated disposal facilities. More problem wastes are generated in Massachusetts than are currently disposed within the state. For example, a large proportion of the state's asbestos is transported to out-of-state landfills at high transportation and disposal fees. The costs associated with special handling and a shortage of such facilities have precipitated illegal dumping.

Collection, processing, and disposal of such problem wastes will be greatly improved in the next decade. Today we observe the emergence of new, improved technologies to handle these wastes, some of which are being proposed in Massachusetts. In addition, DEP recently initiated an improved construction and demolition debris management system, including criminal penalties and increased fines for illegal dumping, as well as creation of a tracking system for generation and disposal. These types of actions, in conjunction with improved regulatory standards and new, promising research will transform the current situation of limited safe disposal capacity. DEP will make every possible effort to facilitate safe processing rather than disposal of these wastes.

An Outlook on the Future

Today, in laying out a detailed plan for the Commonwealth's future system of integrated solid waste management, DEP describes not only how the short-term recycling goals will be reached by 1992, but where management practices will lead beyond that. As integrated waste management becomes established nationally, those processing technologies which are relatively new to the United States today will be more easily incorporated in sound, solid waste management practices in the future. By the year 2000, the state aims to reduce the municipal solid waste stream by as much as 10% through source reduction, and to recycle and compost nearly half of that which is generated.

But even when these goals are met, more MSW will be

produced than can be processed. Current projections indicate that nearly 7.2 million tons of MSW will be generated in Massachusetts in 2000. If the source reduction and recycling goals described above are met and current levels of solid waste combustion remain the same, approximately 350,000 tons of solid waste capacity will be needed in 2000.

DEP will, along with cities, towns, and the private waste management industry, establish this integrated system. This formidable challenge is achievable in large part because of the Solid Waste Act of 1987, which provides more than one quarter of a billion dollars in public funds, enhanced regulatory authority, and a clearly articulated commitment to integrated waste management.

Original DEP plans ambitiously called for obligating all of the Solid Waste Act funds by 1993. Today, this scheme is no longer viable. Changed fiscal conditions in the state have forced the Department to revise its spending plans, cutting the initial years' financial projections by more than two-thirds.

Still, the other components of the Solid Waste Act remain intact. And in spite of fiscal hardship, DEP has not wavered from its integrated solid waste management goal. The necessary response is to increase efforts to stimulate private sector movement toward the integrated system. DEP will accomplish this in three ways:

First, updated solid waste regulations to be promulgated in 1989 (described in Chapter 5) will improve facility planning, construction and operations. In complement to updating standards for protection, these regulations will leverage recycling and composting by requiring each project proponent to establish that their proposal is part of an integrated solid waste management system in the facility service area. In addition, certain recycling and composting operations are now exempt from the standard solid waste siting process.

Second, available Ch. 584 funds are used differently than originally envisioned. The prime example is the Regional Recycling Program. The Department remains committed to making best possible use of public financing advantages, but has broadened its range to significantly induce and influence the shaping of the counter-part, privately-owned facilities. Staff time and development funds are now also allocated to serve cities and towns working together to attract private vendors of recycling services. Thus DEP is aiding these groups to form and to act effectively, as informed consumers, selecting from a variety of available private services.

Third, the DEP is fully using its planning tools. In December of 1988, DEP initiated its assessment of combustion facilities. This assessment includes a halt on the issuance of DEP permits for new combustion facilities. Between the date of

the announcement of the assessment and the issuance of the Master Plan in December 1989, DEP will analyze the justification for increased burn capacity and explore additional policy, planning, and regulatory improvements for the Commonwealth's integrated solid waste management program. The goal of this work is to ensure that the development of future combustion facilities does not preclude coherent solid waste planning and does not act as a disincentive to the development of an integrated solid waste management system.

In addition to changing the DEP approach to solid waste management, these activities are also engaging other state entities. For example, MIFA (Massachusetts Industrial Finance Authority) and the Executive Office for Administration and Finance cannot allocate state-subsidized bonds without evidence of compliance with Department regulations. Changes in the new general facility regulations therefore ensure that state subsidies are only awarded to those projects which are in compliance with the Master Plan.

There are other ways DEP is actively promoting the development of waste disposal facilities which are environmentally sound and consistent with the Master Plan. Key among them is the service provided by the DEP regulatory staff to monitor all solid waste facilities to ensure compliance with the state's solid waste regulations and policies.

DEP staff members work with companies promoting innovative solid waste disposal proposals to inform them of the market basket of financial assistance programs available to them such as the Community Development Finance Program, the Economic Development Set-Aside Program, and the Massachusetts Business Development Corporation. The Department is also working to attract solid waste processing operations and industries, such as papermills and bottle manufacturing facilities, which use recycled materials .

The following section describes the DEP facility analysis anticipating specific capacity growth in areas of the state (see tables 2 - d through 2 - g). This analysis is based on the best available information about emerging municipal and private initiatives and the DEP's plan for allocating Ch. 584 financial resources. It provides practical application of the integrated solid waste management of the hierarchy described in the Master Plan.

The Outlook for 1989 - 1992

The current level of recycling will be greatly enhanced because four materials recovery facilities (MRFs) will be constructed. The state-owned Springfield facility will process 60,000 tons of recyclables per year. SEMASS Corp. is currently planning the design of its facility which is being designed to

process 70,000 tons per year (TPY). In addition, it is expected that ongoing planning by DEP in partnership with communities will result in construction of a facility to service the Cambridge area at 120,000 TPY and the City of Boston at 170,000 TPY (both of these estimates are scaled to 17%-25% of the volume of the MSW stream for the areas served).

Both Nantucket and a private firm, Partyka Resource Management, are currently planning facilities to compost or process MSW. Together, they are expected to process 171,600 TPY. In addition, leaf composting and yard waste processing will re-direct 13% of the MSW stream by 1992.

It is assumed that all existing combustion facilities will operate at 85% efficiency. MSW landfills will operate to dispose of that shortfall waste for which processing capacity does not exist.

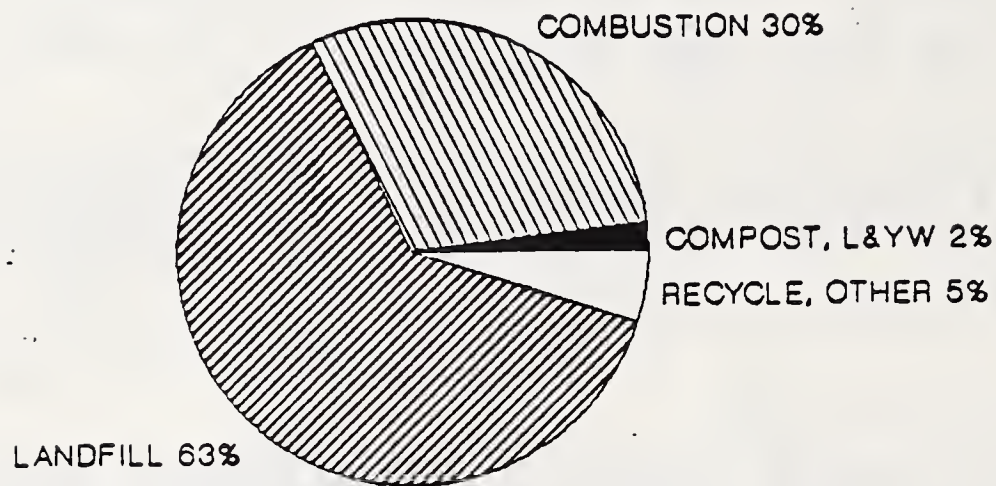
The Outlook for 1993 - 1996

At present, several groupings of communities are working to attract the development of private MRFs to their areas. Largely this has been initiated by municipalities who have a history of working as a region on solid waste issues and are motivated to stay within the volume ceiling on their existing contracts with combustion facilities. Thus, it is expected that the years 1993-1996 will see a trend toward construction of recycling capacity in association with and sized at 25% of the capacity of related combustion facilities. This will result in construction in the Northeast to process 300,000 TPY, 60,000 TPY in the Millis area, and 125,000 TPY in the Worcester area. During this time, and through at least 2000, DEP anticipates that local recycling programs will augment the MRFs. In this way they will account for the same percentage of material over time, but they will handle different recyclables as supplies change.

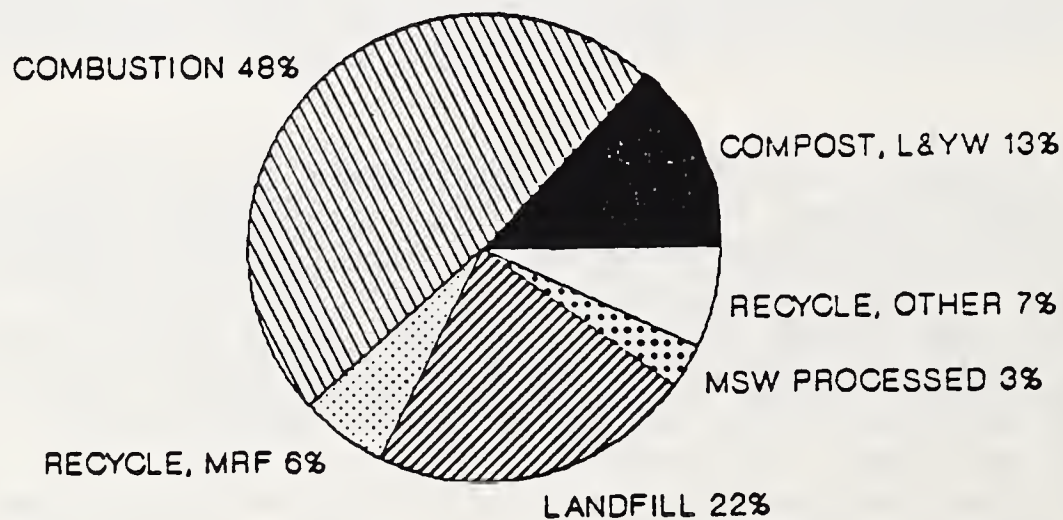
Shrinking landfill options and increased availability of Ch.584 capacity development grant and loan funds are expected to determine the location of MSW processing facilities (compost and/or co-compost) to be constructed by 1996 in Western Massachusetts and the North Central region. Together with a large-scale facility to service Metropolitan Boston, it is anticipated that an additional 264,000 TPY of processing capacity will be on-line. In addition, DEP projects full compliance on its ban of leaves from solid waste facilities and additional yard waste processing operations will yield 15% diversion of these organics from the waste stream.

This facility plan calls for all existing combustion facilities to operate at 85% capacity and MSW landfills to service the processing capacity shortfall.

FACILITIES PLAN 1988



1992

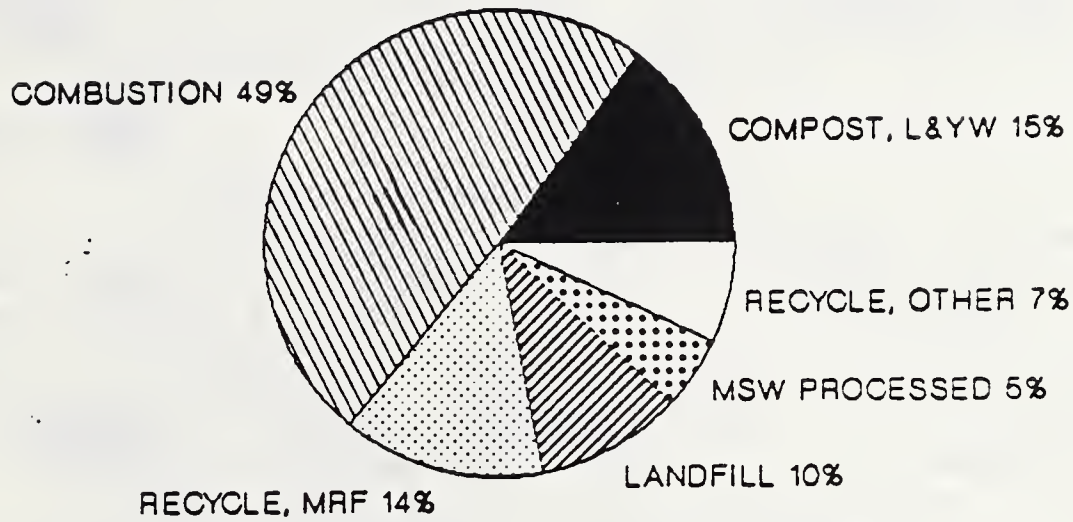


MSW Processing: TPY
Southern Area23,100
Western Region....148,500

MRF:
Cambridge Area....120,000
Boston.....170,000
Rochester Area....70,000
Springfield Area..60,000

Please note, this is a conceptual presentation of the facilities plan. The communities and areas listed on this page are subject to change during implementation of this plan.

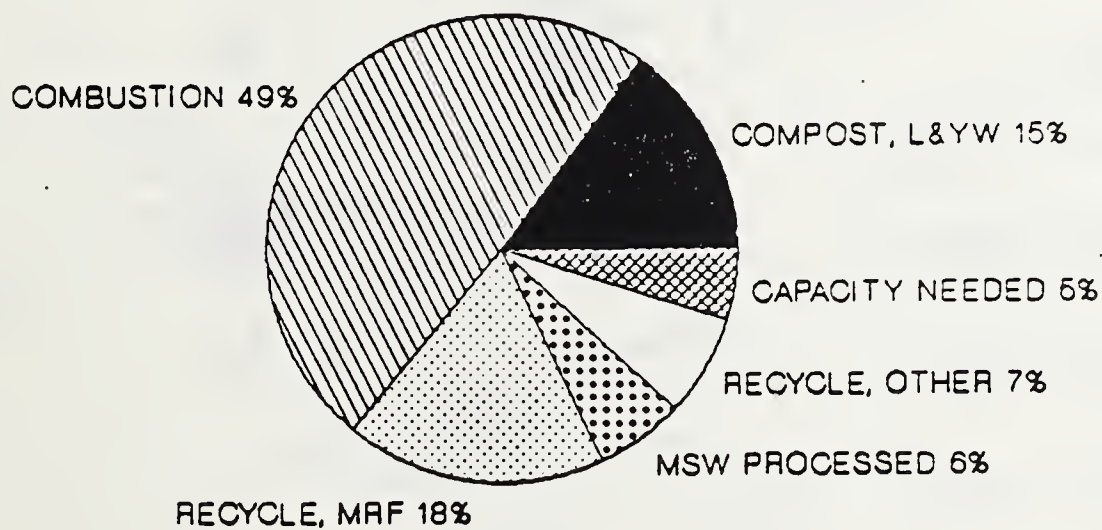
FACILITIES PLAN 1996



MSW Processing TPY
 Norfolk Co.100,000
 North Central...33,000
 Northampton Area.33,000

MRF:
 Merrimac Valley..150,000
 North Shore.....150,000
 Millis.....60,000
 worcester.....125,000

2000



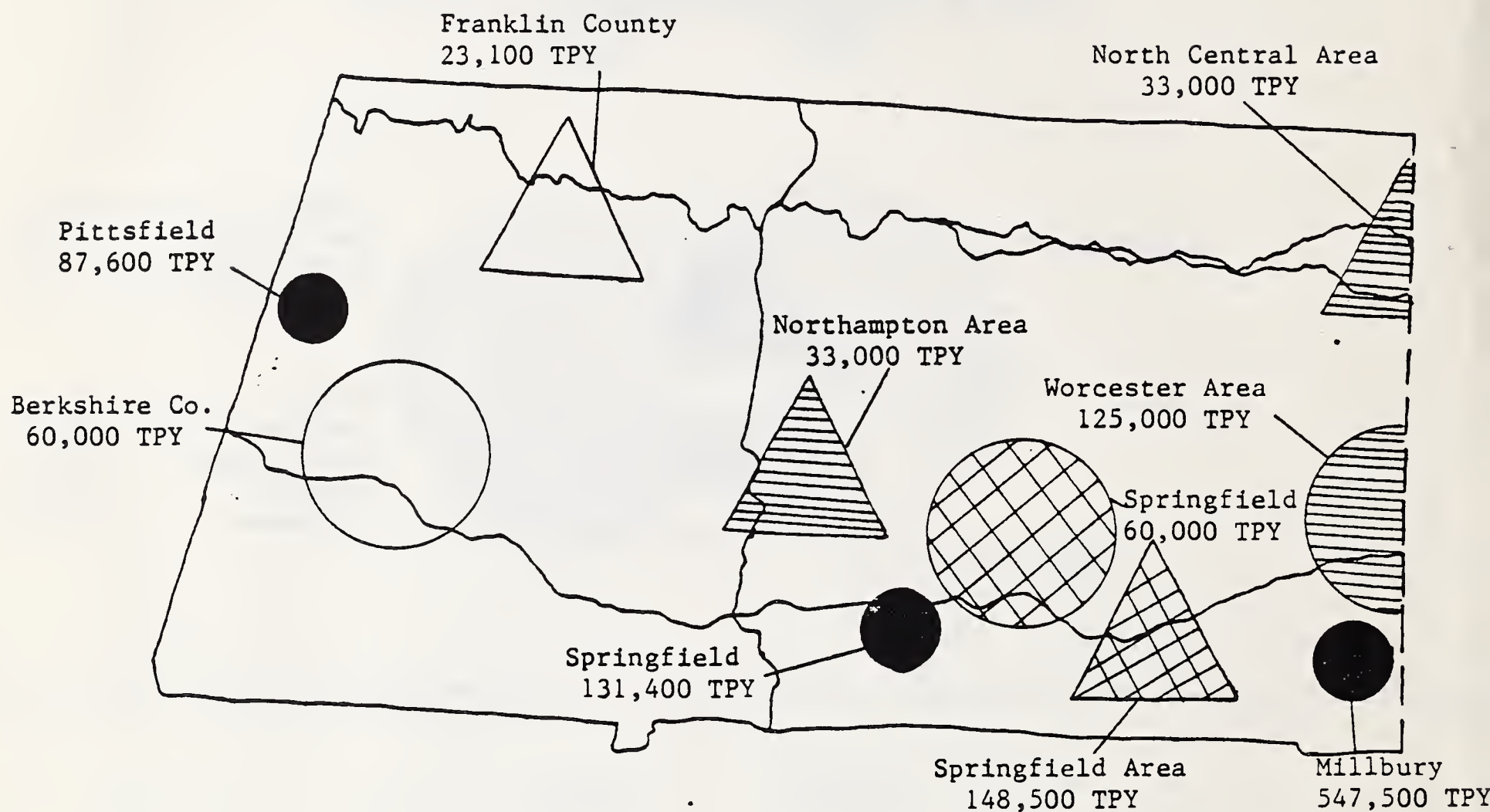
MSW Processing: TPY
 South Shore....23,100
 N. Berkshires..23,100

MRF:
 Fall River.....60,000
 Cape Cod.....70,000
 N. Plymouth.....60,000
 Berkshires.....60,000

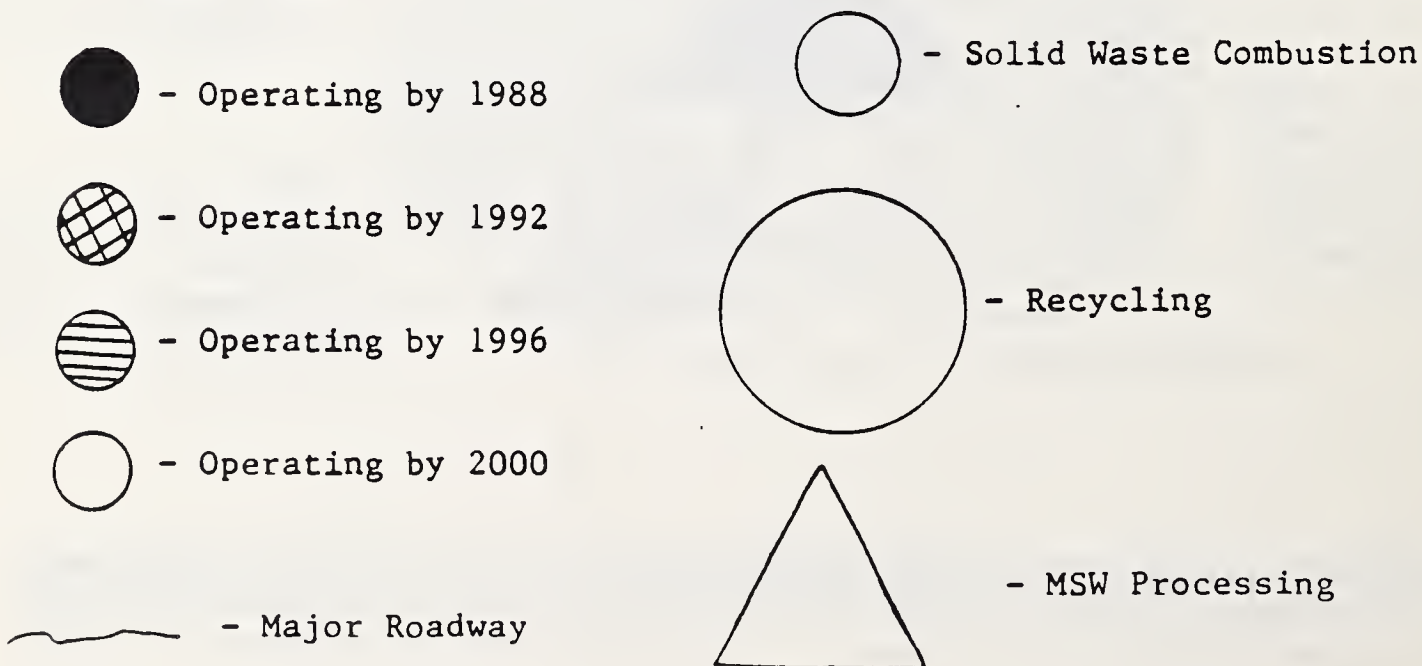
Please note, this is a conceptual presentation of the facilities development plan. The communities and areas listed on this page are subject to change during implementation of this plan.

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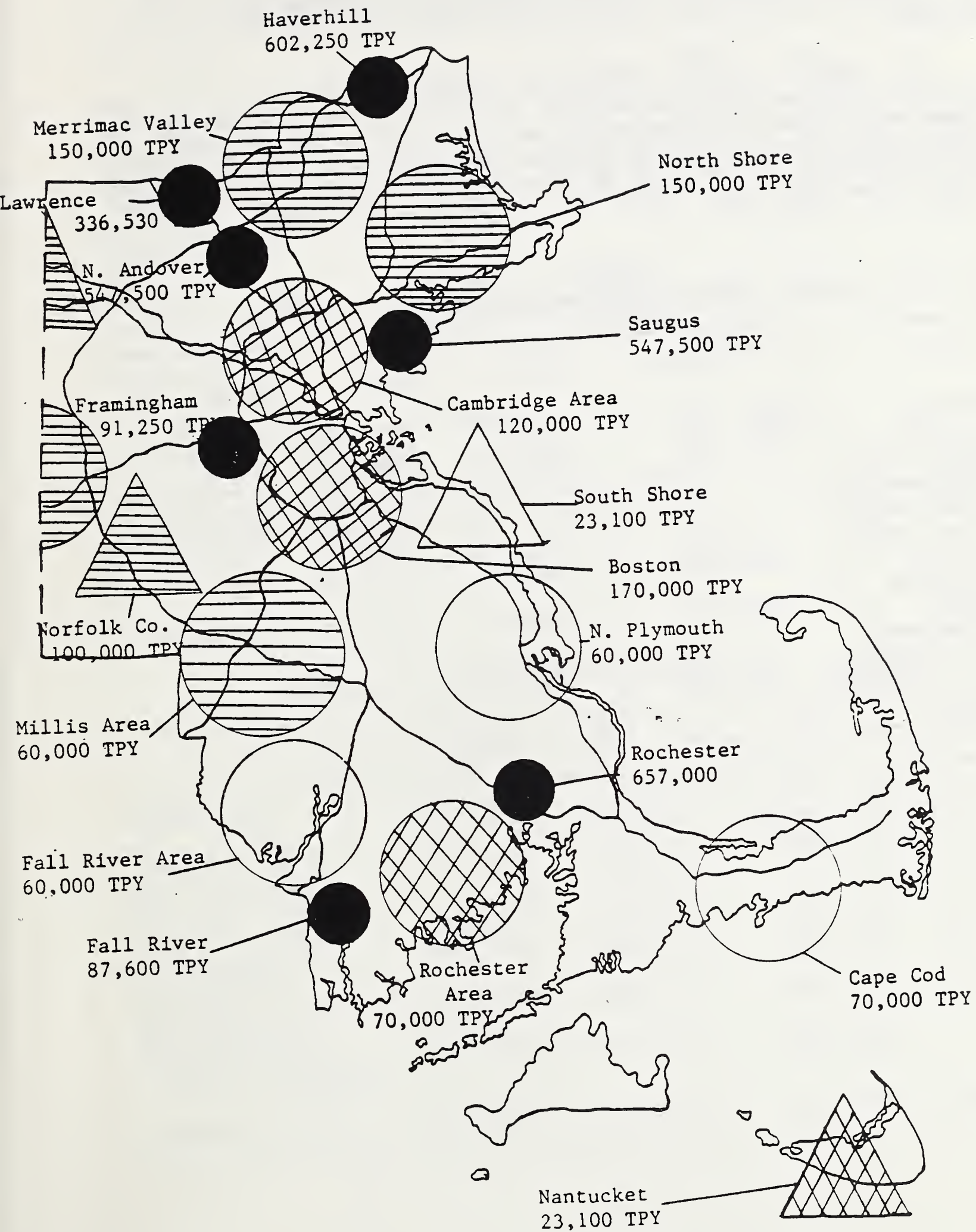
REGIONAL SOLID WASTE FACILITY SYSTEM FOR THE YEAR 2000



KEY



PLEASE NOTE: this is a conceptual representation of the facilities plan. It does not indicate or imply actual community locations for projected facilities.



DEP expects additional recycling capacity to be constructed to service demand in the Southeast (190,000 TPY) and the West (60,000 TPY). Whether through expansion of on-line MRF's, such as Rochester, Millis, and Springfield, or as new construction, additional large scale recycling capacity will be developed.

The phasing-out of MSW landfills will stimulate localized demand for processing capacity in rural sections of Western and Southeastern Massachusetts which will likely be met by MSW compost facilities. Even with these expansive changes in solid waste management called for in this facility plan, significant capacity shortfall will exist in the Southeast Region.

Figure 2 - d
CENTRAL REGION MSW PROCESSING AND DISPOSAL

	1988 actual	1992 proj.	1996 proj.	2000 proj.
Generation	867,510	875,592	885,436	926,974
Gen. w/ SR	867,510	849,324	841,164	834,277
Compost, L&YW	17,350	110,412	126,175	125,141
MSW processing	0	0	33,000	33,000
Recycle, MRF	0	0	185,000	185,000
Recycle, other	43,376	59,453	58,881	58,399
Combustion	448,950	476,325	476,325	476,325
MSW needing disposal	357,834	203,134	(38,217)	(43,589)
MSW disposed (permitted LF)	314,400	132,340	0	0
Zone II closures	0	0	0	0
Capacity + or (-)	(43,434)	(70,794)	38,217	43,589

Figure 2 - e
NORTHEAST REGION MSW PROCESSING AND DISPOSAL

	1988 actual	1992 proj.	1996 proj.	2000 proj.
Generation	3,502,360	3,489,630	3,474,176	3,637,039
Gen.w/S.R.	3,502,360	3,384,941	3,300,467	3,273,335
Compost, L&YW	70,047	440,042	495,070	491,000
MSW processing	0	0	100,000	100,000
Recycle, MRF		0	290,000	590,000
Recycle, other	175,118	236,946	231,033	229,133
Combustion	1,244,176	1,863,763	1,863,763	1,863,763
MSW needing disposal	2,013,019	554,190	20,601	(562)
MSW disposed (permitted LF)	873,221	179,100	14,000	0
Zone II closures	0	0	10,700	0
Capacity +or(-)	(1,139,798)	(375,090)	(6,601)	(562)

Figure 2 - f
SOUTHEAST REGION MSW PROCESSING AND DISPOSAL

	1988 actual	1992 proj.	1996 proj.	2000 proj.
Generation	1,396,612	1,476,618	1,555,472	1,730,776
Gen. w/ SR	1,396,612	1,432,319	1,477,698	1,557,698
Compost, L&YW	27,932	186,202	221,655	233,655
MSW processing	0	23,100	23,100	46,200
Recycle, MRF	0	70,000	70,000	260,000
Recycle, other	69,831	100,262	103,439	109,039
Combustion	140,160	600,060	600,060	600,060
MSW needing disposal	1,158,689	452,696	459,445	308,745
MSW disposed (permitted LF)	2,193,870	1,110,637	624,414	0
Zone II closures	0	0	20,000	0
Capacity +or(-)	1,035,181	1,703,484	823,235	(308,745)

Figure 2 - g
WESTERN REGION MSW PROCESSING AND DISPOSAL

	1988 actual	1992 proj.	1996 proj.	2000 proj.
Generation	852,561	852,876	852,403	885,142
Gen. w/ SR	852,561	827,290	809,783	796,628
Compost, L&YW	17,051	107,548	121,467	119,494
MSW processing	0	148,500	181,500	204,600
Recycle, MRF	0	60,000	60,000	120,000
Recycle, other	42,628	63,205	67,131	71,191
Combustion	137,970	197,100	197,100	197,100
MSW needing disposal.	654,912	250,937	182,584	84,243
MSW disposed (permitted LF)	802,963	38,880	0	0
Zone II closures	0	0	0	0
Capacity +or(-)	177,568	(212,057)	(182,584)	(84,243)

This facility plan calls for the rational siting of processing facilities so that each region of the state will be served by a balance of types of facilities. It will be used to guide Department allocation of Ch. 584 funds and staff resources. Successful realization of the plan depends on continued provision of state financial resources and commitment by municipalities and the private sector to share this vision.

While DEP dedicates its planning and financial resources to this scheme as a long term strategy, it also holds responsibility for planning for the short term. In order to do this, the Department will issue annual reports on solid waste generation and disposal/processing. These reports will reveal the best available data and report on the status of facilities in the development phase at the time of the report's writing. Through this mechanism, the public will be able to measure the success of the Department's long term plan. As necessary, the Department will use this analysis to update this report and to modify application of its planning, financial resources, and regulatory tools in order to best protect the environment by providing for adequate, safe processing and disposal capacity.

Chapter 3. SOLID WASTE MANAGEMENT: ROLES & RESPONSIBILITIES

Solid waste management in the Commonwealth is a responsibility shared by the public and private sector, with increasing private ownership of the facilities. Unlike neighboring Rhode Island, this state does not have the authority to direct the flow of trash; therefore, rational planning for the siting, variety of technologies, and price of disposal is a function of the dynamic between public policy and the market place. This chapter describes the roles and responsibilities of the various public and private sector parties in developing solid waste management systems in Massachusetts.

Communities

Better understanding of the negative impacts of inappropriate solid waste disposal on the environment have yielded improved protective standards and as a consequence, higher costs. Ironically, although today's technology better protects the environment, local officials and citizens have become even more reluctant to site new facilities and assume responsibility for potential problems. These forces have made the solid waste options facing municipal decision-makers today very complex. Massachusetts municipalities bear three solid waste responsibilities.

- o Plan for solid waste management through informed decisions based on citizens' preferences;
- o Arrange for, or directly manage, solid waste collection, processing and disposal; and
- o Through the municipal board of health, protect the public health and safety by appropriate siting and facility monitoring.

Increasingly, communities are recognizing the importance of improving solid waste disposal and processing practices to protect the public health. And, many communities in the Commonwealth face the challenge of finding new disposal capacity. Communities may attempt to develop capacity to service only its own waste stream or join with other communities to develop regional solutions. DEP advocates the formation of regional coalitions, because they have more power

to ensure rational development of facilities that are environmentally sound and there is economy in the scale of regional facilities.

DEP's solid waste management planning grant program provides \$2.5 million in state matching grant funds to eligible public bodies for the development of comprehensive regional solid waste plans. Through this program cities and towns can act together in defining and addressing their common solid waste management problems.

In choosing to manage solid waste communities analyze their solid waste management options as thoroughly and prudently as time and finances allow. The type of analysis a municipality uses can vary. The crudest, and least expensive method, is a simple analysis in which the risks and benefits of each option are described and discussed, but not quantified. Alternately, a municipality can undertake a comprehensive cost/benefit analysis. Here again, various courses of action are considered. Life-cycle costing is a component of cost/benefit analysis in which costs are estimated over the estimated life of the disposal facility. Associated environmental risks are costed out by estimating the clean-up or restitution costs, but this is not a simple process. Estimating the costs associated with public health risks, such as polluted water, or aesthetic damage, such as a blighted landscape, is even more difficult. Done properly, a cost/benefit analysis can be expensive and time-consuming, and many municipalities may not have the expertise, time, or financial resources to carry one out.

The following two depictions present different models of assessment and planning. In the first, the town of Amherst acted on its own to develop a solid waste management system in the face of a disposal crisis. In the second, the communities on Martha's Vineyard joined together to form a regional waste management system.

The Amherst Model

In 1982, the Town of Amherst (population 36,000) discovered that leachate from its landfill was contaminating nearby drinking water wells. Amherst was short on time and on funding for a consultant. Although Amherst did not have the time or money to undertake a rigorous cost/benefit analysis, they managed to develop crude cost estimates of the options before them. With this information, they were able to develop a sound solid waste management plan.

Amherst officials concluded that the town had to close the old landfill, to prevent further groundwater contamination, and, at the same time, construct a new, better one that would not leak. Plans were drawn to cap the old landfill and this work was virtually completed by 1985. A new landfill was sited and

the first phase was constructed with a clay liner to prevent leakage. Amherst's analysis did not stop there. Realizing that space in the new landfill was extremely expensive, the town embarked on an ambitious recycling program to reduce the volume of material going into the new facility.

The Martha's Vineyard District Model

Unlike the Town of Amherst, the Martha's Vineyard communities chose to hire a consultant to perform a comprehensive cost/benefit analysis and options assessment for the region. In the early 1980's the six Martha's Vineyard communities joined together in an effort to prevent an impending solid waste crisis. Formed as the Martha's Vineyard Refuse Disposal and Resource Recovery District, Island towns contracted with consulting firm to analyze the size and nature of the disposal problem and then to evaluate long-term alternatives. The consulting firm completed the analysis and solicited public input on the various alternatives. The resulting report, completed in 1987, formed the basis of the Martha's Vineyard solid waste management system being constructed today.

Today each of the six Martha's Vineyard District towns has a contract with the SEMASS combustion facility. Through the efforts of the district, plans for a central transfer station to deliver waste to the Rochester facility have been proposed for the Town of Edgartown. The District has arranged for depot recycling throughout the Island and plans for a leaf and yard waste composting facility and is looking into feasibility and siting issues. And finally, the island has established a permanent household hazardous waste collection facility.

The Private Sector

An estimated 68% of the MSW generated in Massachusetts in 1988 was processed or disposed at the state's 72 privately-owned solid waste combustion and landfill facilities. An additional 3% was accepted at publicly-owned, privately-operated solid waste facilities. Two hundred thirty-two Massachusetts communities are served exclusively by privately-owned facilities; 163 of these enjoy the certainty of long-term disposal contracts.

In the last ten years, the solid waste combustion industry has benefited considerably from directions taken by the state. Industrial development bonds (IDB's) totaling nearly \$600 million have been used by the industry. Established public policy to coordinate technical assistance and enforcement efforts have worked to shift solid waste management practices away from a network of inferior landfills and incinerators to a system of regional facilities (landfills and combustion facilities) served by transfer stations. Today, 72 of the

state's 82 regional facilities are privately owned and/or operated.

Figure 3 - a
Massachusetts Industrial Finance Authority
Cumulative Listing of Funding Expenditures
through 5/89

<u>Facility</u>	<u>Process</u>	<u>Date</u>	<u>Bond AMT (x\$1000)</u>
Vicon, Pittsfield	Waste-Energy	09/79	6,200
Ogden, Lawrence	Waste-Energy	05/82	58,200
NESWC, Andover	Waste-Energy	02/83	160,000
SEMASS, Rochester	Waste-Energy	12/84	110,000
SEMASS, Rochester	Waste-Energy	09/85	40,000
Flour, Agawam	Waste-Energy	11/85	31,000
Ogden, Haverhill	Waste-Energy	12/86	184,800
Wheelab., Millbury	Waste-Energy	09/87	325
			<u>589,725</u>

The next decade will see continued provision of IDBs, whose allocation will be linked to clearly articulated policy for an integrated solid waste management system. This report calls upon the private sector to work with DEP and communities to:

- o develop non-burn processing facilities which meet the standards established in the solid waste facilities regulations and which respond to the needs identified in this report;
- o assess emerging technologies, especially those for recycling; and
- o develop recycling markets and incorporate manufacturing processes that contribute to source reduction and/or employ recycled materials.

The State

The Executive, Legislative, and Judicial branches of government all set directions for solid waste management practices in the Commonwealth. DEP is the Commonwealth's lead agency for solid waste management. Its powers are derived from legislation, and its specific directions are articulated through policy and regulation. Working with other offices within the Executive Office of Environmental Affairs and through its Division of Solid Waste Management, DEP:

- o Establishes standards for the siting, construction

and operation of Solid Waste Facilities that protect the public health and environment;

- o Issues permits and regulates existing facilities to ensure they comply with these standards;
- o Provides technical and financial assistance to municipalities in their efforts to plan for improved solid waste management, develop new capacity, close old facilities, and assess potential environmental threats from existing or former facilities;
- o Researches available and emerging processing and disposal technologies;
- o Develops new solid waste management facilities where there is a specific capacity need is identified; and,
- o Regularly updates this Master Plan and, as of 1990, will produce annual status reports on solid waste generation, processing and disposal. In it, the Department will report on solid waste generation rates, processing and disposal. It will also include projected changes in capacity for the subsequent 24 months (closures, anticipated shut-downs, and facilities whose development or expansion is in the permit process and/or under construction). This report will play a significant role in shaping future solid waste management systems. DEP will use it as a force to drive the application of Ch. 584 funds.
- o Offers programs of public education geared both to the general public and to solid waste technicians.

As a function of DEP's revised solid waste regulations, solid waste facilities cannot obtain a permit for their facility without first addressing integrated solid waste management planning issues. In addition to these revisions, DEP recommended that MEPA adopt specific review criteria which establish parallel goals in the MEPA review process. One effect of this change will be a shift in the profile of facility types requesting MIFA financing.

MIFA is an independent public agency established in 1978 to stimulate private investment and job creation in Massachusetts by offering a variety of financial incentives, such as tax-exempt and taxable industrial development bonds (IDBs). Its IDB allocations reflect state priorities. During the 1970's and early 1980's the Bureau of Solid Waste Disposal (now the Division of Solid Waste Management) actively promoted mass-burn energy recovery facilities. The Bureau extensively researched potential uses of incinerator ash, and it took a prominent role in development of the North East Solid Waste

Committee (NESWC) combustion facility by organizing the member communities, acquiring the site, arranging financing, and developing the EIR. MIFA offered financial incentives to that industry which today total nearly \$600 million.

Effects of the proposed regulatory revisions, the pending DEP assessment of the role for combustion in the state's solid waste management and changes in market conditions, are reflected in MIFA's pending financial requests. (See Figure 4-b)

Figure 3-b
Massachusetts Industrial Finance Agency
Outstanding tax-exempt IDB allocation requests
May, 1989

<u>Facility</u>	<u>Facility Type</u>	<u>Request (THSNDS)</u>
Legeis. Development, Shirley	Combust	\$18,000
SEMASS, Rochester	Combust	<u>\$70,000</u>
		\$88,000
Resource Control, Springfield	Sludge Compost	\$10,000
Resource Control, Nantucket	Sl/MSW Compost	<u>\$10,000</u>
		\$20,000
Partyka, Chicopee	MSW Recycle	\$42,000
RRS, Springfield	MSW Recycle	\$2,750
SEMASS, Rochester	MSW Recycle	<u>\$8,500</u>
		\$53,250

The Executive Branch sets direction through legislative mandates and citizen referendums. In the last three years critically important initiatives have occupied this arena. One recent example of a legislative mandate was the Solid Waste Bill, which passed as Ch. 584 of the Acts of 1987. Key components of this \$260.5 million legislation direct DEP to:

- o Subsidize Construction of an Integrated Waste Management System - The Solid Waste Act of 1987 provides over a quarter of a billion dollars to develop the Commonwealth's integrated solid waste management system. DEP will administer these funds, employing the reduce, recycle, combust, landfill hierarchy.
- o Research and Develop Improved Technologies - The Act directs DEP to continue to research and develop new solid waste management technologies and to help communities develop innovative comprehensive solid waste management plans.

- o Encourage Regionalism - In the past, most cities and towns met their solid waste disposal needs independently. Since regional facilities are more cost-effective than those serving a single community, the Act encourages regional development. The Act therefore mandates financial assistance programs in the Act give preference to regional projects.
- o Establish an Air Emissions Testing Protocol - Using approved DEP methodologies, solid waste combustion facility operators must conduct air emissions tests every nine months. The tests cover dioxins, furans, heavy metals, and other chemicals. Results must be made available to the public. These facilities must be fitted with state-of-the-art technologies to control emissions. All existing facilities must add acid gas scrubbers to their air quality equipment unless they have already done so. To finance continued upgrading, each resource recovery facility operator shall set aside 3% of all tipping fee revenues in a dedicated fund, which will be used to meet DEP pollution control requirements.
- o Assess Existing Solid Waste Facilities - Many communities have ignored the environmental threats posed by active and inactive solid waste facilities. DEP will take the lead in identifying existing problems through preliminary assessments of every landfill site. Following discovery of environmental problems at particular landfills, DEP will provide grants for additional study to identify the exact nature and extent of the threat.
- o Create a Solid Waste Superfund - The Act sets up a solid waste clean-up fund similar to that already in place for hazardous waste under Chapter 21E of the Massachusetts General Laws. If a public health threat is discovered at a solid waste facility, DEP will notify the owner of what remedial steps are necessary. In cases where private landfills have caused groundwater contamination problems, the landfill owner is responsible for the clean-up. Should the owner refuse to carry out the specified remedial work, DEP has the power to carry out the necessary work and to charge the owner of private facilities for up to three times the cost of that work. Municipal owners of solid waste facilities must pay DEP for the cost of remedial work, if they do not do the work themselves.
- o Improve the Regulatory System - The Solid Waste Act restructured the site assignment process and directed DEP to develop regulations to govern the site assignment process. These regulations were

promulgated on September 9, 1988. The purpose is to ensure that facilities will be sited where they will not threaten public health and safety or the environment, and to ensure a rational siting process to facilitate development of needed solid waste disposal capacity. These siting regulations were promulgated in September, 1988, thereby achieving a key goal of the Act.

- o Increase Penalties for Illegal Dumping - The Act expands DEP authority to impose penalties for improper solid waste management in the Commonwealth. DEP can levy heavier fines and illegal dumping is now punishable by up to two years imprisonment.

Currently two bills, one sponsored by Representative Roosevelt (D-Boston), and one by Representative Rosenberg (D-Amherst) are before the Legislature. The Roosevelt bill calls for a fee of 3 cents per package sold within the Commonwealth that is not made from recycled material or that is made from a material recycled at a rate less than 30%. Funds from this fee will support recycling programs throughout Massachusetts. The Rosenberg bill tackles the problem of developing markets for recyclables by granting a 50% investment tax credit (to be taken in 10% increments over 5 years) to manufacturing companies investing in equipment that uses recycled materials as a feedstock. The bill further provides a use credit equal to 10% of the value of recycled feedstocks purchased within a year.

Public referendums also set directions. For example, in 1986 Massachusetts citizens voted, through public referendum, to expedite clean-up of hazardous waste sites in Massachusetts. The referendum, known popularly as Question 4, directed DEP to assess and clean-up hazardous waste sites in Massachusetts within defined time frames. It also required the discovery and listing of a specified number of new sites every year. The effect of the regulation was an increased level of effort devoted to assessment and cleanup activities by DEP and a heightened public awareness of the existence of these sites.

This referendum has had an impact on the Solid Waste Landfill Assessment and Cleanup (LAC) Program. Citizens with concerns about landfills in their cities and towns have been encouraged by the public interest groups which campaigned for passage of the referendum to request that these landfills be placed on Question 4's list of potential sites. A number of landfills which are being addressed by the LAC program have now been placed on this list of sites. This action has served to increase the complexity of the landfill assessment and cleanup process.

Currently, the question of who bears the financial burden for improvement to and management of solid waste facilities

rests in the Judicial system. One view holds that solid waste management is a municipal responsibility. In another view, however, solid waste management is part of the state's responsibility to protect public health.

The view that any costs incurred by a municipality in meeting post-1981 state-mandated standards should be borne by the state was supported by the decision of the Superior Court in the case of the Town of Norfolk vs. the Commonwealth of Massachusetts. The case involves the state's requiring Norfolk to install a liner in its municipal landfill to meet compliance standards. Norfolk sought to shift the liability for the construction of the liner to the state, under M.G.L. Chapter 29, Section 27c (Proposition 2 1/2). But in the Norfolk case, the Commonwealth argued, DEP was acting under regulations promulgated in 1971, and was regulating an activity that communities opt to undertake in the first place. Both the Division of Local Mandates and, on appeal, the Superior Court found in favor of the Town. The case is currently under appeal.

The effects of this decision are potentially far reaching and could hinder development of more environmentally sound solid waste management. DEP would not be able to establish standards for safe systems, unless the state would be prepared to bear the financial burden, or unless DEP could document that the policy was established before 1981 (the year Proposition 2 1/2 was adopted). The courts cannot order the state to pay municipalities for the cost of compliance, but can release the municipalities from an obligation of compliance if the state does not pay within a year. Municipalities could, therefore, expand or develop a waste management system without sufficient environmental safeguards. This would pose a substantial barrier to both the development of environmentally sound solid waste management in Massachusetts and the imposition of increased liability to their citizens upon municipalities.

Final court decision of this case is expected within the next year. At that time DEP, local decision-makers, and environmental advocates will have clear direction on the question of who pays to close today's and construct tomorrow's solid waste system.

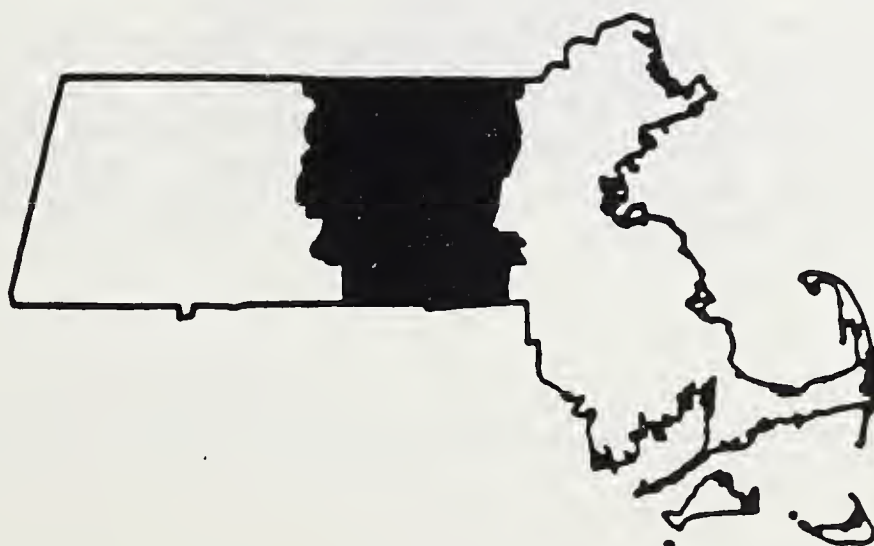
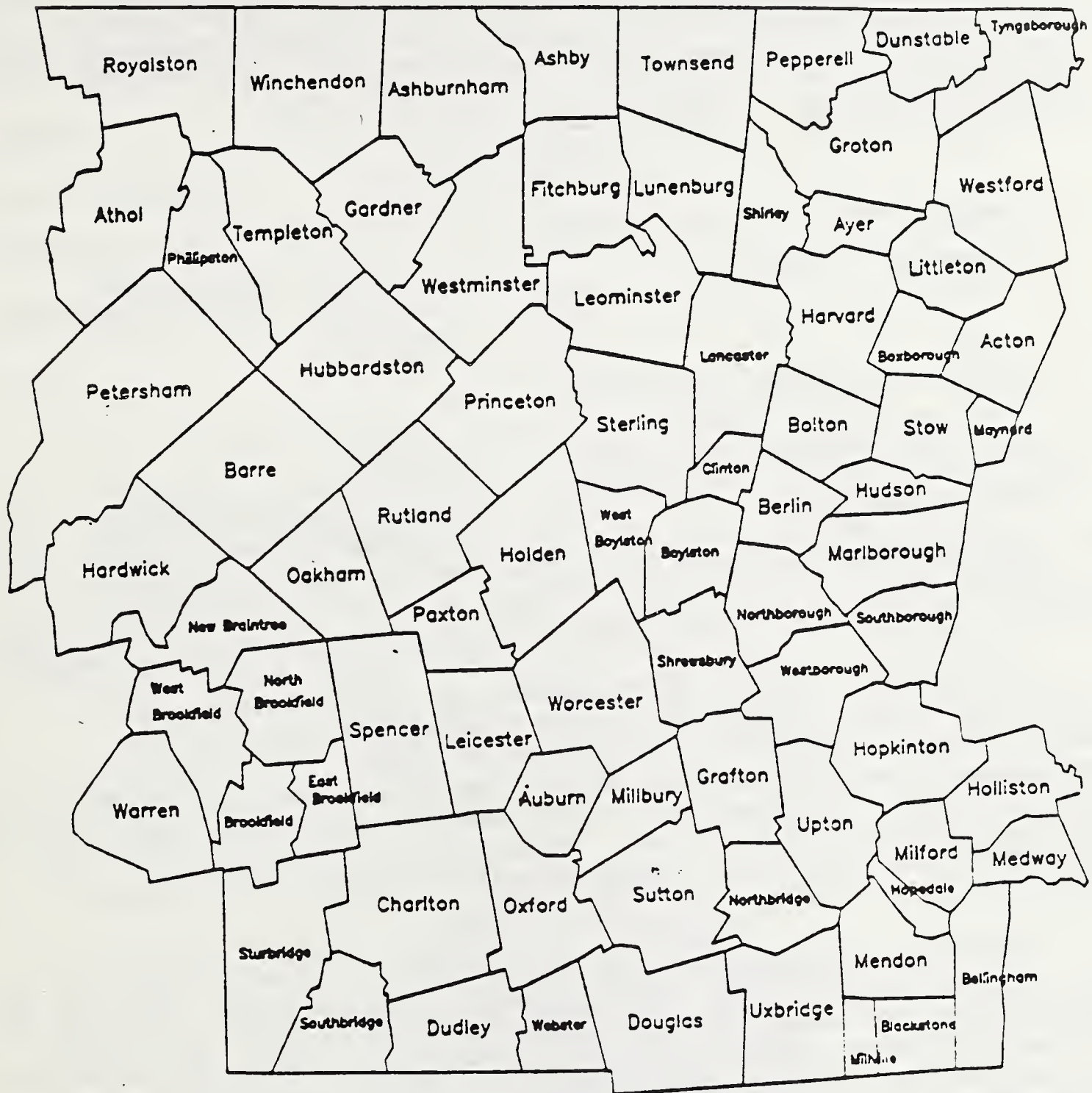
Chapter 4. THE COMMONWEALTH'S INTEGRATED SOLID WASTE MANAGEMENT SYSTEM: CURRENT STATUS

A closer look at present conditions, activities, and programs within the Commonwealth is presented in this section. Current disposal capacity conditions, efforts by communities to form solid waste management regions, and programs to integrate recycling and composting with existing solid waste management practices are highlighted.

These reports were compiled by DEP staff in the four regional offices. These offices, located in Worcester, Woburn, Lakeville and Springfield, service the regions in which they are located. It is important to point out that the regions described in this report were established at about the same time that the Department was started. They are convenient to use because the DEP database is organized by region, but they are not meant to imply boundaries for planning or any other solid waste management activity. Today there are several cross-region proposals or planning entities at various stages of development, and the Department anticipates that there will be several more in the years to come.

DEQE Central Region

(35)



The Central Region

The Central Region relies predominantly on landfilling and incineration. There are currently 35 active landfills; 33 are municipally-owned facilities and 2 are privately-owned. There is a 1,500 tons/day waste-to-energy facility serving the Region in Millbury.

Figure 4-a
Key Statistics

Counties in Region:	Worcester, Middlesex (partial), and Norfolk (partial)
Number of Cities and Towns:	80
1988 Estimated Population:	871,000
MSW Generated:	868,000 tons in 1988
MSW Recycled and Composted:	43,000 tons in 1988

Presently, 37 of the region's 80 communities utilize landfills within the region, and 4 communities haul to out-of-region landfills. Berlin and Howard use a regional commercial landfill in Plainville, Douglas hauls to a landfill in Fall River, and Marlboro uses several different landfills and waste combustion facilities. Residents of Uxbridge and New Braintree independently contract with private solid waste haulers.

DEP anticipates that 16 of the 35 municipal landfills in the Central Region will reach capacity before 1990. Two of the communities relying on these landfills have signed contracts with solid waste combustion facilities. However, the remaining 14 communities (comprising nearly 10% of the Central Region population) will seek new disposal capacity within the next two years.

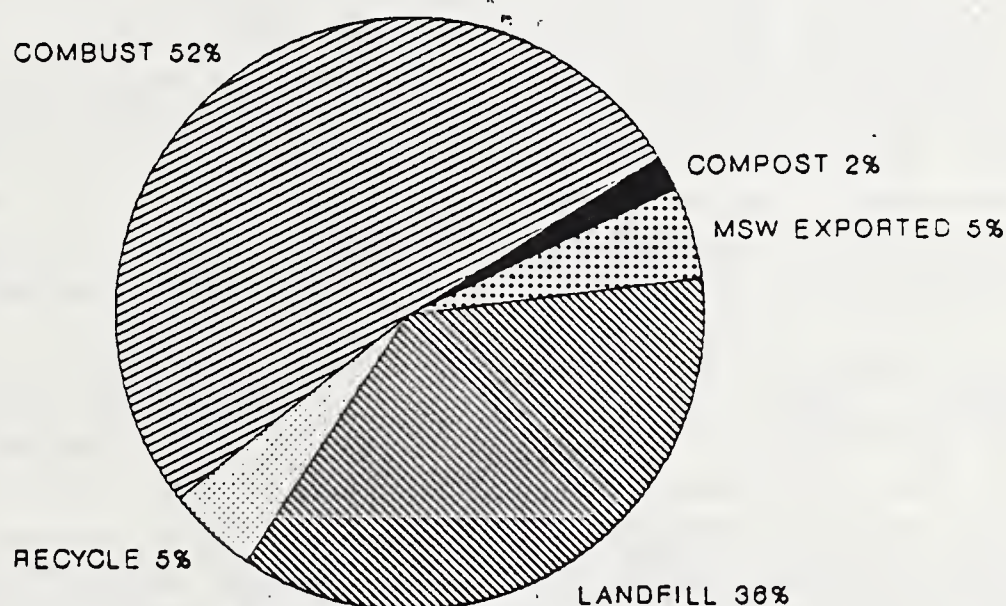
Thirty-seven communities in the region have signed waste disposal agreements with resource recovery facilities. Of these, 27 communities are currently delivering their municipal solid waste to the Wheelabrator facility in Millbury, 7 deliver to Ogden-Martin in Haverhill, and the remaining 3 use the NESWC facility in North Andover.

Figure 4-b
1988 Solid Waste Processing and Disposal Methods
in the Central Region (Estimated Volumes)

<u>Method</u>	<u>MSW Processed or Disposed (in thousands tons/year)</u>	<u>Percent of Total Regional Generation</u>
Recycle/Compost	61	7
Combust	449	52
<u>Landfill</u>	<u>314</u>	<u>36</u>
Total	800	95

Figure 4-c is a graphic presentation of municipal solid waste processing and disposal within the region. Please note that this graph accounts for only the initial method of treatment, therefore, ash landfills are not accounted for. MSW is transported out of this region for processing and disposal as there is only the capacity to process and dispose 95% of the MSW generated within the region.

Figure 4-c
MSW Processed or Disposed
within the Central Region



1988 GENERATION: 868,000 TONS

Municipal Trends and Activities:

- o Although only a small amount of the waste stream is presently being recycled, this is expected to change dramatically in the next few years. Five regional recycling projects being planned in Central Massachusetts, involving 33 of the 80 communities, should start operation within three years and recycle 70,000 tons per year.

The Central Massachusetts Resource Recovery Committee (CMRRC) is comprised of Auburn, Grafton, Holden, Millbury, Northborough, Oxford, Rutland, Shrewsbury, Southborough, Leicester, Westborough, and Worcester. DEP funded a feasibility study for the construction of a state-funded large scale, recycling project for the Committee. The study clearly affirmed that such a project would be beneficial. The Committee is now analyzing its options to attract a private vendor or to pursue public funding for the project. In the Spring of 1989, the Committee was awarded an additional \$40,000 by DEP to hire a consultant to assist in siting a materials recovery facility (MRF) within the CMRRC region.

In February, 1989 the towns of Harvard, Bolton, Berlin, Lancaster, Clinton, and Sterling organized a regional solid waste disposal committee. The Committee is dedicated to maximize the potential of recycling, and to implement a program for the composting of leaf and yard wastes. The Committee has expressed interest in expanding its membership by as many as five more communities. The Committee has prepared three requests for proposals. Through one RFP, the Committee is seeking a vendor to collect (either at curbside or at central repositories) all recyclable materials, provide for the disposal of non-recyclable materials, and define and implement both the public education component of the program and any compliance measures that are deemed necessary.

The Town of Littleton recycles approximately 600 tons per year. This rate of recycling accounts for 17%, by weight, of the Town's total MSW generation. Between 30% and 40% of the residents volunteer their efforts to recycle some 200 tons of paper, 50 tons of glass, and 150 tons of metals and appliances. An effort to recycle plastic beverage containers was recently instituted in the spring of 1989. Early signs are that the idea is well supported by the townspeople. The Town also composts approximately 200 tons of leaves per year in a program that was begun in the fall of 1988.

In the winter of 1989, the Montachusett Regional Planning Agency began to organize a recycling committee with

representatives from area communities including Fitchburg, Lancaster, Hubbardston, Phillipston, Templeton, Athol, Townsend, Sterling, Lunenburg, Leominster, Shirley, Gardner, and Harvard. The committee is presently reviewing different recycling systems and will be studying composting and resource recovery options.

The Town of Shirley is organizing a regional recycling program with a number of towns interested in participating including Pepperell, Lunenburg, and Townsend. The participating towns will jointly purchase and share a compartmentalized recycling vehicle. This vehicle will be used for curbside collection and as a drop-off center at the landfills of the participating communities.

The Town of Northbridge is coordinating an effort with Upton and Uxbridge to research and analyze disposal solutions for wastes which are difficult to dispose such as white goods, household hazardous wastes, waste oil, and tires. The three-town committee is reviewing the option of siting a recycling center in Northbridge.

In 1988 the Town of Sturbridge, in an effort to increase utilization of recycling and composting, formed an adhoc committee of interested citizens to examine different recycling programs, and to help the town design and implement the program of choice. The complete recycling center opened in May, 1989. It is modeled on the Wellesley facility and has an areas for exchange of reusable items, such as furniture and books and for the collection of clothing, white goods, scrap metals, auto batteries, plastics, motor oil, glass, paper, and tires. The town has contracted with a licensed hazardous waste hauler to establish a household hazardous waste collection facility.

- o In the past two years, Central Region municipalities have shown increased interest in composting leaves. In 1986, there were 6 composting projects, the number rose to 10 in 1987, and to 17 in 1988. The amount of leaves composted has doubled between 1987 and 1988, from approximately 4,000 tons to 7,925 tons of leaves.

In 1987, the Town of Holden established a dropoff leaf and yard waste compost operation at the closed town landfill. Town employees chip the brush and pile the leaves in windrows. Approximately 183 tons of leaves and grass clippings were composted on this small site (three quarters of an acre) in this past year.

Laughton's Nursery in Westford is a commercial regional program for the towns of Westford and Chelmsford. The towns are responsible for collection and delivery to the

nursery, while the composting operation is performed by nursery personnel. The final compost is used by the nursery.

Westminster Farms, located in Westminster, received a site assignment and DEP plan approval for a compost operation in 1987. Approximately 8,364 tons of chicken manure, 17,843 tons of cranberry wastes, and animal bedding are composted annually by the program. The final product is bagged and sold as fertilizer.

In 1987, the City of Worcester initiated a leaf compost program aided by a technical assistance grant from DSWM. Leaves are picked up at curbside and transported to one of three composting sites in the city. At one site, the city composted approximately 870 tons of leaves in 1988. After the compost has been tested for contaminants, it is used for landscaping purposes on parks and other public grounds. Next year Worcester plans to compost nearly 2,700 tons at three different sites.

- o The Lancaster Regional Solid Waste Disposal Committee is seeking a vendor who would locate a combustion facility no larger than 150 tons per day within the region. Under the terms of the RFP the facility would be responsible for the collection of solid waste either at the curbside or at central repositories. Further, the facility would be required to provide for recycling, the disposal of non-recyclable solid wastes and the disposal of ash from the combustion facility. The final RFP the Committee released seeks proposals from owners of existing and planned incinerators and recycling operations for prices of long-term contracts.

The Legeis Corporation proposes to build a 200 tons/day facility in Shirley. This project is currently undergoing environmental review. A draft Environmental Impact Report is expected to be released in the first half of 1989.

- o The Towns of Barre and Townsend are treating the leachate collected from their town landfills by means of a batch flow, mechanically aerated treatment process in a series of lagoons. The State is currently evaluating the treatment efficiency of the lagoons. The required discharge permits have not as yet been issued by the Department and are pending review of these facilities.

Seaman Paper Company has been granted an approval from DEP to use its paper sludge as a daily cover material at the Gardner Landfill. The application of the paper sludge as a daily cover material is seen as a beneficial use of a discarded material. At the end of one year, an evaluation of the potential for long-term use of sludge as a cover material will be made.

Commercial Trends and Activities

- o Foster Forbes, located in Milford, purchases amber and clear recycled glass from private recycling companies and community programs. The company purchased over 2100 tons of glass from recycling facilities in Massachusetts last year.
- o The Gen-Pak Corporation is building a polystyrene recycling facility in Leominster. The facility will recycle used polystyrene containers and food trays from educational facilities, state and federal facilities, restaurants, and industrial post-consumer packaging. The corporation has designed a process to pelletize and sell the resin from these products. The facility is designed to recycle approximately 5 million pounds per year.

The Northeast Region

MSW is transported out of this region for processing and disposal. Approximately 1.5 million tons per year are shipped to facilities out of the region, including several in New Hampshire. The region recycles and composts 7%, incinerates 36%, and landfills 25% of the MSW that is generated within the region.

Figure 4-d
Key Statistics

Counties in Region:	Essex, Middlesex, Suffolk, Norfolk (partial)
Number of Cities and Towns:	95
1987 Population Estimate:	3,000,000
MSW Generated:	3,500,000 tons in 1988
Waste Recycled and Composted:	245,000 tons in 1988

Almost two-thirds of the municipalities contract with incinerator vendors or haulers who have contracts with incinerators. The length of those contracts varies from 2 to 20 years. Because many communities have relatively long-term contracts, regional planning efforts in this region are not as strong as in others. However, those communities with only 2 to 5 years remaining on existing contracts are now forming regional entities to identify shared problems and plan for future management of their solid waste.

Figure 4-e
1988 Solid Waste Processing and Disposal Methods
in the Northeast Region (Estimated Volumes)

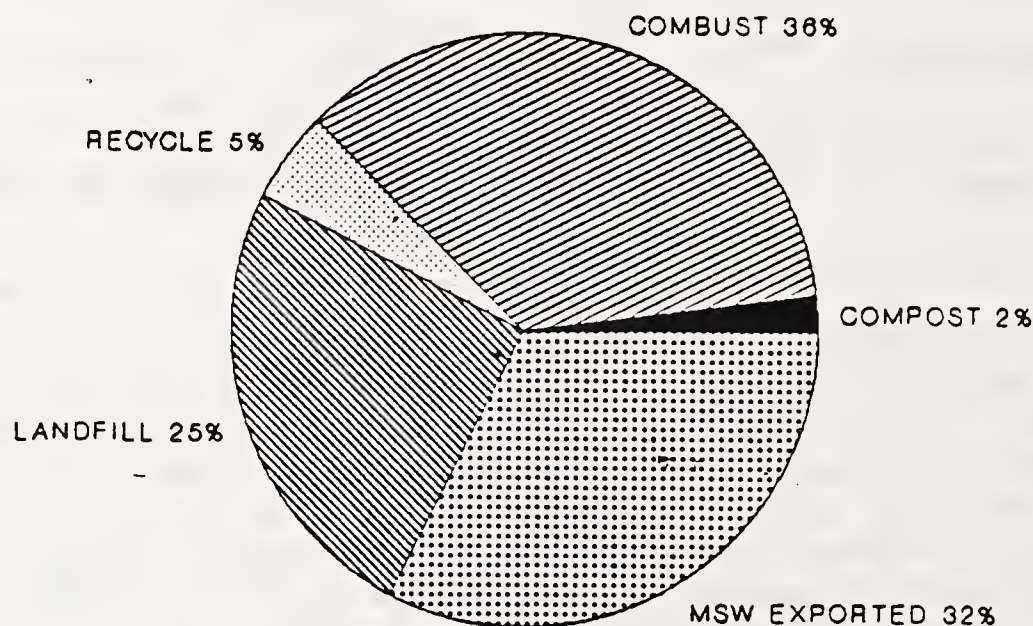
<u>Method Generation</u>	<u>MSW Processed or Disposed (in thousands tons/year)</u>	<u>Percent of Total Regional</u>
Recycle/Compost	245	7
Combust	1,300	36
<u>Landfill</u>	<u>873</u>	<u>25</u>
Total	2,418	68

There are several disposal capacity concerns in the Region. By 1990, approximately 15% of the landfill space will reach permitted capacity. In addition, the Northeast Region's use of out-of-state facilities could pose a major capacity problem as other states, including New Hampshire, may soon shut their doors to out-of-state solid waste.

Figure 4-f is a graphic presentation of municipal solid waste processing and disposal within the region. Note this graph accounts for only the initial method of treatment; ash landfills are not reported on the graphs. The Northeast Region, a net exporter of MSW, only has capacity to process or dispose 56% of the MSW generated within its boundaries.

Figure 4-f
MSW Processing and Disposal
within the Region

NORTHEAST REGION



1988 GENERATION: 3,600,000 TONS

Municipal Trends and Activities

- o The Department through staff and consultant resources is assisting Boston to formulate a comprehensive integrated waste management plan.

The Northern Middlesex Area Commission (NMAC) is conducting a regional solid waste planning process on behalf of eight of its communities including Billerica,

Chelmsford, Dracut, Dunstable, Lowell, Tewksbury, Tyngsboro, and Westford. The Commission has submitted an application to DEP for a local solid waste planning grant. Currently more than half of the communities have no long-term arrangements for solid waste management. The plan, as proposed in the application, would profile existing solid waste management practices and conditions in the region, estimate long-term needs and available capacity, evaluate short-term regional strategies to expand and strengthen waste recycling, composting, and household hazardous waste management efforts, and assess the feasibility and advantages of new regional processing and disposal facilities.

- o The Commonwealth's second regional recycling facility (MRF) is in the planning stages and will serve six core communities: Cambridge, Brookline, Newton, Watertown, Belmont, and Waltham. These communities have a population base of 350,000. The number of communities will eventually be expanded to include enough surrounding communities to make up a population base of at least 500,000. This program will divert nearly 15% of the MSW generated by the member communities.

The communities expected to participate in the Cambridge MRF program have strong citizen support for recycling. An advisory committee for the region comprised of municipal officials, DPW Directors, and DEP staff works to develop interim solutions. The committee is exploring group marketing contracts for recycling services and other joint strategies for recycling. In the interim, the cities of Somerville, Watertown, Cambridge, and Belmont have established recycling drop-off centers. Newton and Brookline have begun curbside collection of newspaper.

In 1988, with DEP assistance, the City of Boston established a drop-off program for newspaper and glass in Jamaica Plain. To date the program has recycled more than 115 tons of paper and 27 tons of glass and so far has saved Boston \$18,898 in avoided disposal costs while generating \$27,671 in income. Several other drop-off sites have been established around Boston including the Boston Food Coop in Boston. A pilot curbside collection program in Jamaica Plain is planned for Spring 1989, but fiscal constraints may delay the program for another year.

The "Commercial Waste Recycling Feasibility Study", co-sponsored by DEP, the City of Boston, and the Greater Boston Chamber of Commerce, was released in the Spring of 1989. It characterizes the potential for recycling commercial wastes in Boston, identifies existing barriers to successful recycling, and recommends the following plan of action for the next two years: 1) form a commercial

recycling task force, 2) expand intermediate processing capacity in the Boston area and markets for recyclables, and 3) implement several pilot demonstration projects in each segment of the business community, and call upon employers to develop waste reduction and recycling plans.

Many communities in the Northeast region including Wakefield, Melrose, and Saugus have volunteer drop-off recycling programs. Other communities have implemented curbside collection of newspaper, including Peabody, Methuen, Quincy, Brookline, Framingham, Somerville, and Chelmsford. Lexington and Bedford pick up glass at the curbside and Newton plans to do so in the fall of 1989. Lexington and Peabody recently passed ordinances making curbside collection of recyclables mandatory.

The North Shore communities which utilize the Saugus RESCO waste-to-energy facility have approached DSWM for information and assistance in setting up recycling programs. Wheelabrator Technologies, the owner of the waste to energy facility, is considering building a MRF.

The New England Solid Waste Committee (NESWC) communities act as a region, although they are geographically somewhat spread out. The Committee last year issued an RFP for a MRF vendor. WtE, a Bedford based firm, won the right to negotiate with NESWC. WtE is one of the firms which plans to build a MRF in the Merrimack Valley.

The Millis Consortium including Ashland, Dedham, Dover, Framingham, Holliston, Hopedale, Hopkinton, Mansfield, Medfield, Medway, Milford, Millis, Natick, Needham, Norfolk, Norwood, Sherborn, Sudbury, Walpole, Wayland, Westwood, and Wrentham have been meeting as a group to develop a regional recycling program and to bring a MRF into that region. DEP has been attending meetings and providing technical assistance, and has just awarded a contract to Alternative Resources, Inc. of Concord, MA, to provide recycling planning assistance to the consortium.

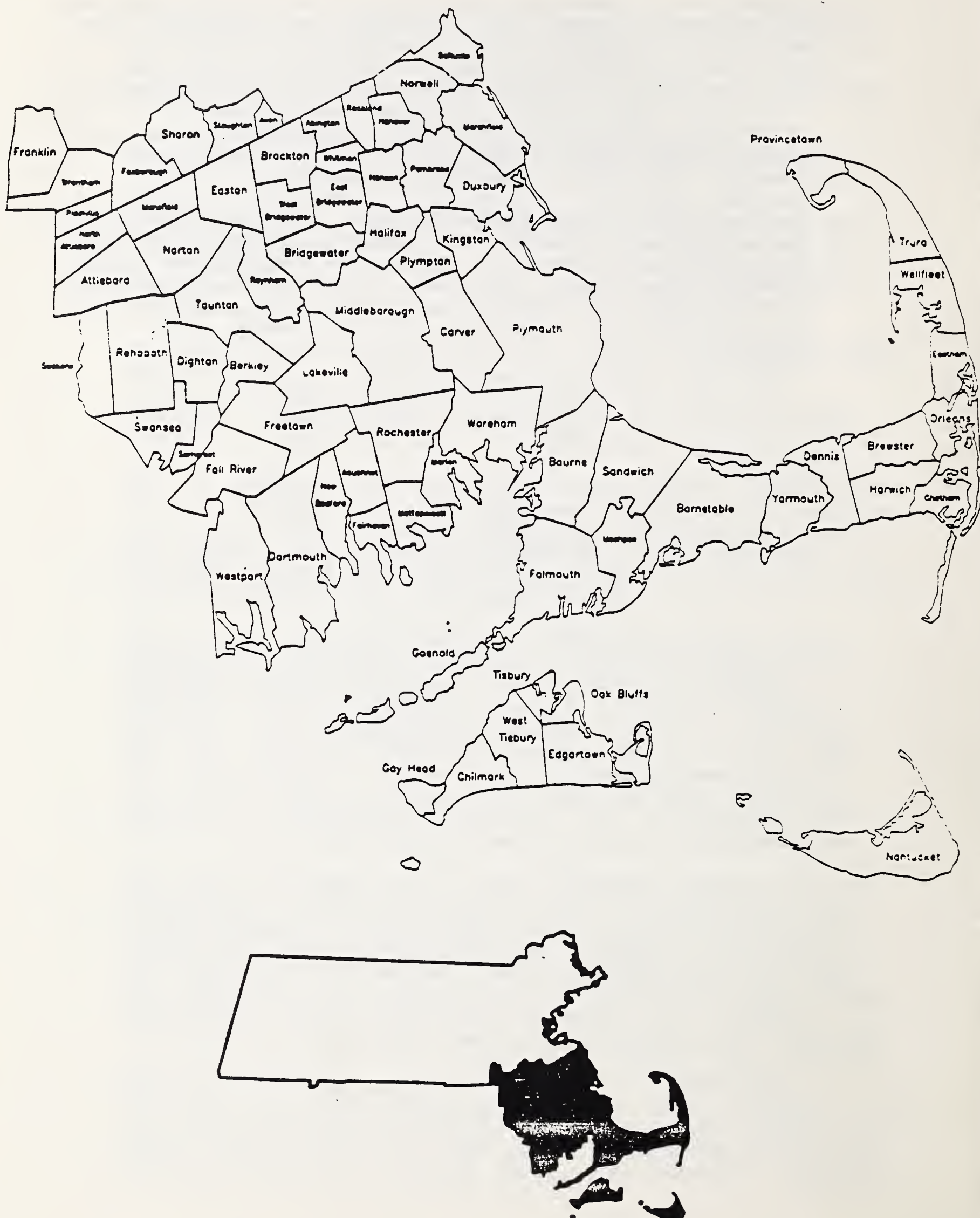
- o More than 25 communities in the Northeast region are now composting leaves, collected by their Public Works crews or by residents bringing the leaves to a drop-off site. Communities such as Wellesley and Rockport, which do not have municipal collection, have operated drop-off sites for leaves and yard waste for more than five years. Other communities such as Braintree, Hingham and Cohasset initiated drop-off leaf composting programs more recently.

There are several on-going agricultural composting projects, including projects at Geiger Farm in Ipswich and Peter Britton's farm in Hamilton, which compost fish wastes and manures, and food wastes from large scale food manufacturing (such as Ocean Spray) with manures. Laughton

Nurseries, in Westford, has set up a composting operation which accepts leaves from Chelmsford and Westford. The material produced is used by the nursery. Weston Nurseries, in Hopkinton, has a similar operation and accepts leaves from Framingham, Needham, and Medfield. A regional coordinating committee, consisting of representatives from each of the eight communities, will work with the NMAC to set goals for and approve the results of the phase 1 planning process.

The Merrimack Valley Regional Planning Council (MVRPC) is assisting communities in its region-- including Newbury, Newburyport, West Newbury, Georgetown, Groveland, Rowley, Amesbury, Merrimack, Salisbury, Haverhill, Methuen, North Andover, and Andover--in developing composting programs and disseminating information through forums and meetings.

Southeast Region



The Southeast Region

A net importer of solid waste, the Southeast Region relies primarily on landfilling. There are currently 54 active landfills, of which 48 are municipally-owned and/or operated and 6 are privately-owned and/or operated. Together, these 6 commercial landfills take in nearly 20% of the state's municipal solid waste stream. There is one incinerator in the City of Fall River. There are seven privately-operated wood waste facilities, one privately-operated ash facility, three sludge facilities, and one demolition debris facility.

Figure 4-g
Key Statistics

Counties in Region:	Barnstable, Bristol, Dukes, Nantucket, Plymouth, and Norfolk (Partial)
Number of Cities and Towns:	75
1988 Population Estimate:	1,300,000
MSW Generated:	1,400,000 tons in 1988
MSW Recycled and Composted:	98,000 tons in 1988

At this time, 71 of the 75 communities comprising the Southeast Region dispose of their solid waste at landfills. Three communities utilize the Fall River incinerator, and one community transports its waste to a resource recovery facility outside the Region.

Of the 71 communities presently disposing at landfills, 49 utilize municipal landfills. Twenty-two communities contract among the Region's 6 commercial landfills which, together, take in nearly 60% of the Region's total municipal solid waste stream.

Figure 4-h
1988 Solid Waste Processing and Disposal Methods
in the Southeast Region (Estimated Volumes)

<u>Method Generation</u>	<u>MSW Processed or Disposed (in thousands tons/year)</u>	<u>Percent of Total Regional</u>
Recycle/Compost	98	7
Combust	120	86
<u>MSW Landfill</u>	<u>2,200</u>	<u>157</u>
Total	2,418	250

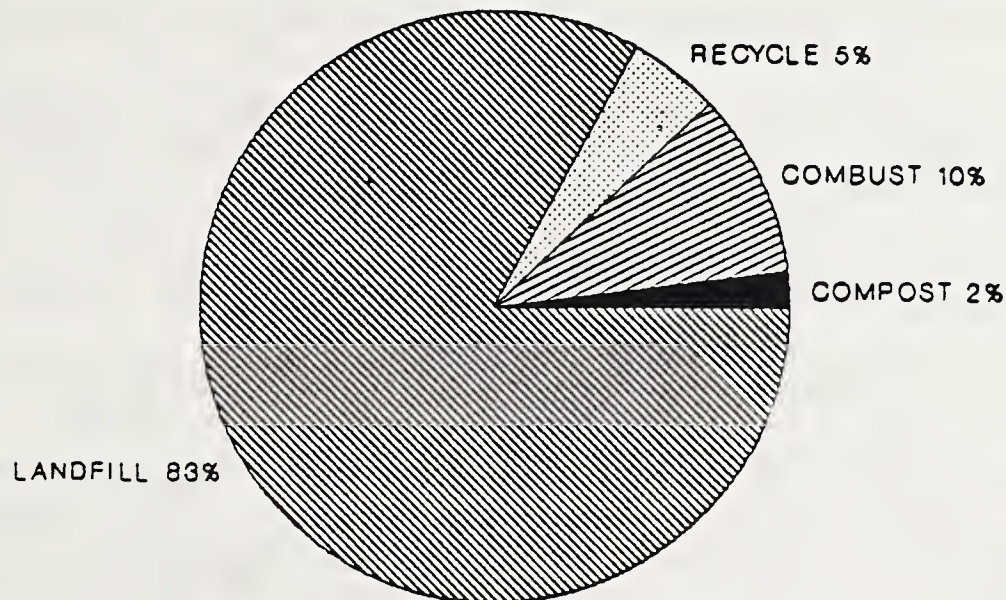
This disposal pattern will change dramatically when the SEMASS waste-to-energy facility begins full operation. At that time 32 communities (30 from the Southeast Region) will begin delivering their municipal solid waste to the 1,800 ton-per-day (TPD) combustion facility in Rochester. Of the 30 contracted communities in the Region, 22 are presently disposing at municipal landfills; 7 have contracts at commercial landfills in the region; and 1 utilizes the Fall River incinerator.

The SEMASS waste-to-energy facility is the first resource recovery facility located in the Southeast Region. At full operation, it will process 31% of the Region's municipal solid waste. Once the facility is fully operational, it will process nearly 657,000 tons per year.

Of particular significance is the impact SEMASS will have on disposal at municipal landfills. Prior to SEMASS, almost 40% of the Region's waste was disposed at municipal landfills. When SEMASS begins full operation, only 14% of disposal within the Region will be at municipal landfills.

Figure 4-i is a graphic presentation of municipal solid waste processing and disposal within the region. Note this graph represents only the initial method of waste treatment. Ash landfill capacity is not reported on this graph. The Southeast region is a net importer of solid waste.

Figure 4-i
MSW Generated vs MSW Processed/Disposed within the Region
SOUTHEAST REGION



1988 GENERATION: 1,400,000 TONS

Municipal Trends and Activities

- o A number of solid waste facilities have recently been proposed for the Southeast Region. Together, the following proposed facilities represent nearly 1.6 million tons per year of new capacity:

Figure 4-j
Proposed Solid Waste Facilities for SE

1.	Crapo Hill Regional Landfill(Dartmouth)	-	171,600	TPY
2.	SEMASS(expansion) WtE(Expansion)	-	234,000	TPY
3.	O'Donnell Landfill/Recycling(Kingston)	-	727,740	TPY
4.	Demo/Recycling(Norton)	-	130,000	TPY
5.	SEEDCO(N. Attelboro)	-	117,000	TPY
6.	Resource Recovery (Taunton)	-	125,000	TPY
7.	MSW Composting(Nantucket)	-	22,100	TPY
8.	Wood Energy Facility(Brockton)	-	200,000	TPY

- o There are three Solid Waste Districts within the Region, representing 11 communities collectively. They are:

1. Carver/Wareham/Marion Regional Refuse District
2. New Bedford/Dartmouth Regional Refuse District
3. Martha's Vineyard Regional Refuse District.

Each of the three districts have pursued regional solutions to their solid waste disposal needs. Carver, Wareham, and Marion presently dispose at the District's regional landfill in Carver but have signed long-term disposal contracts with SEMASS waste-to-energy facility. Once SEMASS begins accepting waste from the 3 communities, the Carver landfill will serve as the ash repository/waste bypass landfill for SEMASS.

New Bedford and Dartmouth presently dispose at their own municipal landfills, and the District has approved plans for the construction of a 150 acre landfill in Dartmouth to serve the two communities. The District is currently pursuing financing of the facility and anticipates construction during the next few years. In the interim period, the District has started to explore implementation of volume reduction measures, including a leaf composting program and a landfill ban on bulky wastes, in an effort to conserve critical remaining capacity at both landfills.

Each of the six Martha's Vineyard District towns has signed a contract with SEMASS. These long term contracts will commence if the third-phase boiler is permitted and becomes operational. Until that time, the Martha's Vineyard District Committee has worked out an agreement with SEMASS to accept waste on a spot market basis. Through the efforts of the district, plans for a central transfer station to deliver waste to the Rochester facility have been proposed for the Town of Edgartown. To augment these management strategies, Martha's Vineyard decided to impose a fee schedule on waste disposal which is standardized throughout the island. Accordingly, there will be a charge for each 32 gallon container, or its equivalent, brought to the transfer station. There will be no charge for recyclables brought to local collection centers. The District has plans for a leaf and yard waste composting facility. And, finally, the island has established a permanent household hazardous waste collection center.

Solid waste management and planning strategies are being implemented in many other communities in the region through the efforts of regional planning entities, including Cape Cod Planning and Economic Development

Commission (CCPEDC) and the Southeastern Regional Planning and Economic Development District (SRPEDD). Together CCPEDC and the Barnstable County Solid Waste Task Force are in the process of evaluating regional recycling alternatives for the Cape's 15 municipalities. And, many local officials are actively seeking to develop a mandatory recycling program for co-mingled recyclables. Toward this end, the Cape Cod Planning Agency, with financial assistance from DEP, is directing a comprehensive regional recycling study to assess collection and processing options for the Cape's 15 communities. The study will evaluate and determine which recycling alternatives available to the Cape Cod area have the lowest life-cycle cost, greatest waste diversion potential, and lowest degree of financial risk.

SRPEDD has also worked closely with DEP to promote sound solid waste management. Most recently DEP and SRPEDD have been actively involved in the formation of a new regional group, which combines several small existing solid waste committees from Attelboro, Norton, Mansfield, Seekonk, Berkley, and Foxboro. They are presently identifying and evaluating short- and long-range goals and objectives including: formation of a solid waste district, increased source reduction, local recycling programs, and leaf and yard waste composting. This group is interested in attracting a private regional recycling facility.

The South Shore Coalition is a group of ten south shore communities working together to develop a regional solution to their shared solid waste problems: Hingham, Hull, Cohasset, Weymouth, Scituate, Marshfield, Duxbury, Hanover, Pembroke, and Norwell. The coalition has been awarded \$150,000 from DEP, through the 1987 Solid Waste Act, to develop a model integrated solid waste management plan addressing the long term needs and alternatives of its ten member municipalities. This plan will identify types of preferred disposal options, choose sites and recommend funding alternatives for construction of a regional facility to serve member towns. A request for proposals was recently completed and is being circulated for responses. Estimates call for the plan to be completed within the next year. DEP anticipates that the accomplishments of the South Shore Coalition under this grant will provide valuable information to other municipal coalitions attempting to solve their solid waste management problems on a cooperative level.

Another group which has been particularly active in solid waste management is the Bristol County Selectmen's Association. Primarily through the efforts of Representative Phillip Travis, the group has provided support to several local solid waste committees and has

been especially involved in promoting mandatory recycling ordinances. Indeed, 4 communities in the Southeast Region have passed mandatory recycling ordinances conditional upon a state-constructed MRF in the region.

Most recently, the five communities of New Bedford, Fall River, Taunton, Brockton, and Attleboro, representing the Southeastern Massachusetts Partnership, have each appointed representatives to address common solid waste management problems, goals, and regional solutions.

- o Several Southeast Region communities are now operating local recycling programs, particularly for glass and paper. None of these existing programs, however, provides curbside pickup of separated recyclables; all are dependent upon resident drop-off at recycling centers, landfills, or transfer stations. These local recycling programs have had varying rates of success corresponding to fluctuations in markets for resale of recyclables. Aluminum and paper have consistently remained the most stable in price and, therefore, the most widely collected recyclables. While vendors are paying communities for aluminum, most communities are paying approximately \$10-15/ton for removal of paper and glass.

SEMASS has introduced a proposal for large-scale recycling. They propose use of "recycle bags" rather than standard household set-out containers to eliminate the need for costly separate collection of recyclable materials. Presently SEMASS is preestablishing its markets for recycled glass, metals, paper, and plastics. It anticipates a 10 to 30% reduction in the incoming municipal solid waste stream, depending upon the level of community participation.

The facility intends to accept recyclables from both SEMASS and non-SEMASS communities in one of three delivery schemes: (1) in recycle bags as a mixed load with the solid waste stream; (2) in recycle bags only; and (3) as semi-processed, separated recyclables. In the first delivery scheme, pickers at the facility will remove the recycle bags from the conveyor belt before they reach the tipping floor. The operators will employ an incremental tip-fee scale to further encourage recycling. The highest fee would be charged for non-separated solid waste. The fees decrease significantly for waste containing recyclables in the recycle bag. Revenues from the sale of the recyclables will be shared with the participating communities. A direct payment method will be used for semi-processed direct delivery. SEMASS is drafting mandatory recycling ordinances for consideration by communities and is soliciting expressions of commitment from communities without SEMASS contracts.

Other recycling facilities are being proposed for diverse components of the waste stream. They are being designed to process difficult-to-dispose-of wastes such as wood waste, concrete, asphalt, and stumps.

- o More than three years ago, faced with a municipal landfill near capacity, the Nantucket Long Range Solid Waste Disposal Committee was appointed to evaluate and recommend a solution to on-island solid waste disposal. After rejecting several proposals for incinerators and one for a new landfill, the Committee voted to sponsor a comprehensive feasibility study for solid waste composting. That study, completed in 1986, was the basis for an RFP for the construction and operation of an MSW composting facility. Seventeen bidders were narrowed to four, each representing four different technologies. In 1987, the Committee travelled to Europe to see each of the processes in operation. In February, 1988, the Committee received final proposals and from them, selected Resource Control, Inc. to design, construct, finance, and operate the compost facility for a 20-year period. Construction is expected within the next two years.

The Town of Nantucket has been awarded a \$97,350 grant by DEP for various components of this project and for a yard/wood waste composting facility to be located at the town landfill. The grant funded activities include technical assistance in developing suitable performance guarantees and contract conditions, environmental review in the siting process, facility design and construction overview, and compost analysis and utilization demonstration.

In 1988 several communities in the Southeast Region initiated leaf and yard waste composting in an effort to divert significant amounts of solid waste from their landfills and to realize avoided disposal costs. At present, 9 communities are actively composting, while another 14 have plans to begin programs within the next year.

One of the more significant composting projects in the Region is the state-sponsored pilot project at the Yarmouth municipal landfill. This operation, developed with State financial and technical assistance through DEP, is in its second year of operation. A major objective of this pilot project is to analyze the composted material and provide data on applicable utilization of that material. Likewise, this project will provide the basis for establishing testing and operational guidelines for subsequent compost facility siting, operations and application of composted material.

Acushnet, Fairhaven, Mattapoisett, and New Bedford are developing a regional leaf composting program. The site is in Acushnet, and each of the participating towns will collect leaves in a curbside collection program in biodegradable bags. It is estimated that as much as 3,700 tons of leaves will be collected from the four communities.

- o The Crapo Hill Landfill, proposed for construction on a 150-acre parcel in Dartmouth, would serve Dartmouth and New Bedford. Final plans for the facility have been approved by DEP and construction is expected to begin within the next two years. Recently, the District awarded the design contract for the leachate pre-treatment facility, an integral component of the landfill, and is expected to secure financing for construction of the landfill itself within the next few months. When completed, the landfill will receive approximately 450 tons per day from the two communities. The estimated life of the landfill ranges from 25 to 34 years, depending on such factors as whether or not municipal sludge is accepted for disposal. In an effort to extend the life of the landfill, the District explored waste reduction measures including source reduction, composting and recycling. It intends to allow for implementation of these measures in the design of the landfill.

Commercial Trends

- o The BFI landfill in Fall River has negotiated with six communities to pick up separated leaf and yard waste at reduced tipping fees for composting at their Fall River facility.

One community that was particularly successful in this joint venture with BFI was the Town of Weymouth. In cooperation with the Weymouth Solid Waste Task Force and the League of Women Voters, the local Department of Public Works purchased 250,000 paper, biodegradable bags at a cost of \$71,792. Through an ambitious education program, brochures were printed and circulated describing the pilot project and the benefits of leaf composting. During the fall of 1988, 242,000 bags were distributed free of charge to Weymouth residents. Approximately 122,000 bags were collected, representing over 1,300 tons of leaves. This amounted to a solid waste disposal cost savings of \$34,256.

- o The SEMASS solid waste combustion facility, presently permitted at 1,800 TPD, is awaiting DEP approval of a third phase boiler which would add 900 tons per day to

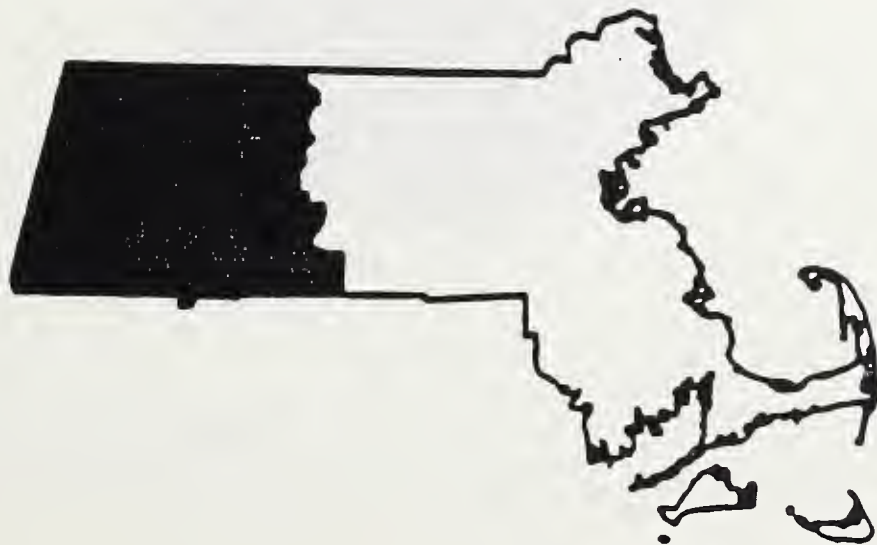
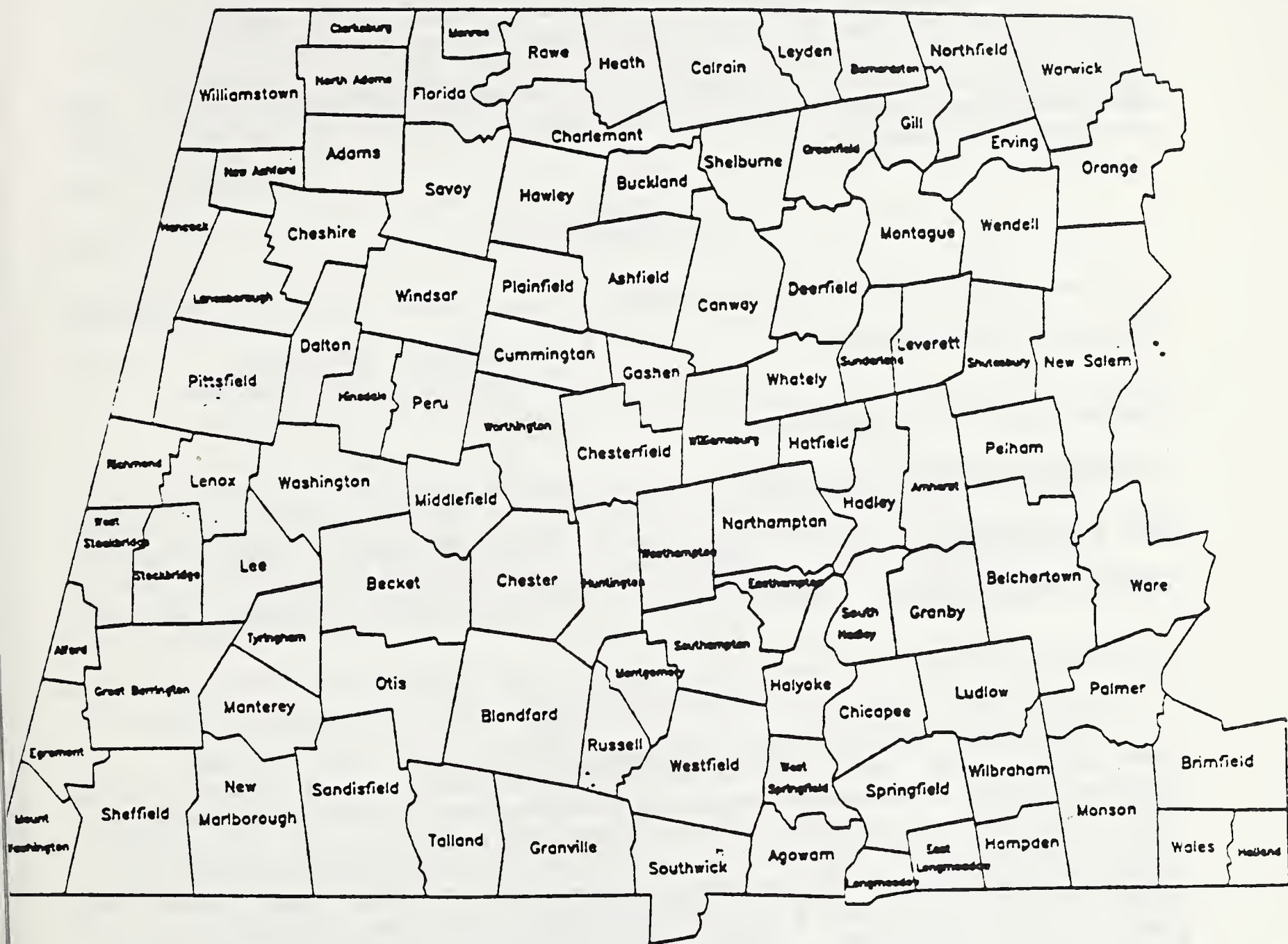
the current capacity. The permit application for this project was submitted to DEP prior to the commencement of the combustion assessment and it will be evaluated independently. Approval of the additional 900 TPD would provide disposal for several more communities who have already signed contracts, including the six Martha's Vineyard communities.

- o A proposal by O'Donnell Sand and Gravel to develop an integrated solid waste management facility on a 150-acre site in Kingston anticipates a number of solid waste processing activities, including recycling, composting, and reprocessing of asphalt and concrete. The proposed recycling and composting operation would handle 700 TPD; the reprocessing operation, 99 TPD; and, the landfill facility, 2,000 TPD. An Environmental Impact Report is now being prepared to address questions raised in the MEPA process. This project has not received site assignment from the Board of Health or any permits from DEP.
- o Proponents of a proposal to develop a demolition debris recycling facility and landfill on a 97-acre site in Norton have been required to prepare an Environmental Impact Report. No permits, including site assignment from the local Board of Health, have been issued for this project.
- o SEEDCO (South-Eastern Energy Development Corporation) has responded to an invitation from the North Attleboro Solid Waste Committee to develop a proposal for a waste-to-energy facility. The proposal calls for a 450-TPD massburn facility, designed to handle the entire residential and commercial waste stream of North Attleboro and up to eight surrounding communities. The facility would be an integrated solid waste management facility comprised of the following components: 1) waste-to-energy plant; 2) recycling facility; 3) stump and brush grinding operation; 4) composting operation; 5) demolition debris processing plant; and, 6) a tire processing operation. This proposal has not received any permits including site assignment from the local Board of Health.
- o The Taunton Resource Recovery Facility project, proposed by Legeis Development Corporation, calls for development of a 500 TPD facility on a 4 acre site in Taunton. An Environmental Impact Report is also being prepared for this project. No permits, including site assignment from the local Board of Health, have been issued.
- o The Brockton Wood Energy Facility, a proposal by Energy Initiatives Inc., calls for the development of a 200,000 tpy power production facility in Brockton. The facility

will combust wood-based fuels--both urban waste wood (construction and demolition debris, pallets etc.) and green wood (chips from land clearing and forest management operations)--to produce approximately 23 megawatts of power to be sold to the Eastern Edison Company. Plans call for the facility to be operational in the first quarter of 1992. No site assignment or permits have yet been issued for the proposed facility.

DEQE Western Region

(59)



The Western Region

The Western Region now relies primarily on landfills. Eighty-nine of the Region's 101 communities dispose of their municipal solid waste in landfills. The remaining 12 use resource recovery facilities in Pittsfield and Springfield. The ash from these facilities is disposed of at the Pittsfield and Springfield landfills.

Figure 4-k
Key Statistics

Counties in Region:	Berkshire, Franklin, Hampshire, and Hampden
Number of Cities and Towns:	101
1988 Population Estimate:	800,000
MSW Generated:	853,000 tons in 1988
Waste Recycled and Composted:	60,000 tons in 1988

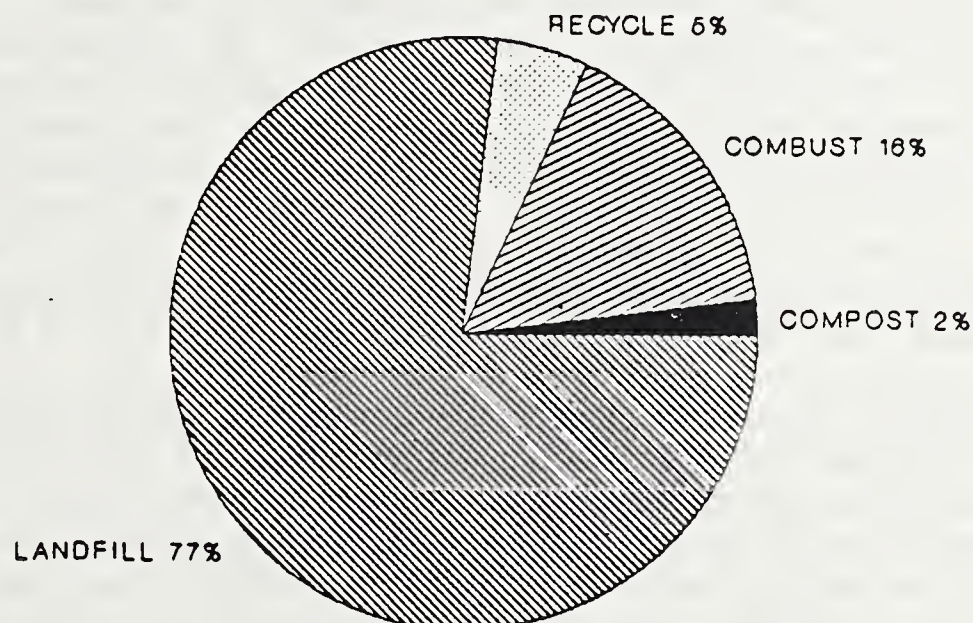
DEP anticipates that, within three years, more than one-half of the Region's 39 existing landfills will close due to lack of space, new regulatory requirements, or other reasons. Many communities already have placed restrictions on commercial waste, demolition debris, and other bulky or problem wastes to conserve capacity. As capacity dwindles at other facilities and costs of disposal are experienced, recycling and composting have grown very appealing. Today, the first state-owned recycling facility is under construction in Springfield. There is an increasing tendency among communities to pool disposal resources. Of the 39 active landfills, 12 are regional because they accept MSW from more than one community.

Figure 4-1
1988 Solid Waste Processing and Disposal Methods
in the Western Region (Estimated Volumes)

<u>Method</u>	<u>MSW Processed or Disposed (in thousands tons/year)</u>	<u>Percent of Total Regional Generation</u>
Recycle/Compost	60	7
Combust	138	16
<u>Landfill</u>	<u>803</u>	<u>94</u>
Total	1,001	117

Figure 4-m is a graphic presentation of municipal solid waste processing and disposal within the region. Note this graph accounts for only the initial method of treatment. Ash landfills are not described on the graph. A net importer of MSW, the Western Region accepts approximately 4% more waste than it produces.

Figure 4-m
MSW Generated vs MSW Processed/Disposed within the Region
WESTERN REGION



1988 GENERATION: 853,000 TONS

Municipal Trends and Activities

- o There are strong efforts underway throughout the region to form multi-community entities for regional solid waste management.

Thirteen communities joined together in the fall of 1988 to form the Northern Berkshire Solid Waste District. Initially, the District concentrated on organizational and planning needs. A District director and recycling coordinator will be hired this summer. The director will lead an eight month effort, funded by DEP, to develop an integrated solid waste management plan. This plan will evaluate the regional use of remaining local landfill capacity as well as integrate long-term processing and disposal capacity needs and alternatives. The recycling coordinator will develop a collection and transfer plan for the delivery of district recyclables to the Springfield MRF. In addition, the coordinator will assist district members with implementation of leaf and yard waste composting programs, recycling of materials not handled by the Springfield MRF, and household hazardous waste collection programs.

In June, 1989 the South Berkshire County District including 14 towns was formally established. By September the district agreement is slated to be complete. The District intends to explore long-term regional waste management solutions.

Fifteen Franklin County communities voted this spring to participate in the Franklin County District and another 5 communities are considering district memberships at special town meetings this summer. A solid waste plan will be completed in the fall of 1989. This plan, supported by a DEP planning grant to the Franklin County Commissioner's Office, will determine the long-term solid waste capacity shortfall of the District and identify viable sites for a regional landfill. The District is also developing plans for collection and transport of some or all of its recyclables to the Springfield MRF.

Since 1986, 18 of Hampshire County's 20 communities have been involved in regional solid waste planning efforts. This activity focuses around two groups which both employ an integrated solid waste management approach. Both groups are anticipating construction/expansion of landfills together with source reduction, composting, recycling, and co-composting components. In addition to regional activities, the mayors of the five cities in Hampshire and Hampden counties, through their designees, met for more than a year to discuss problems and possible remedies. This Solid Waste Action Team (SWAT) released its final report in December, 1988. Recommendations from

the SWAT report are currently being implemented. With the exception of two communities, all of Hampshire County is expected to participate in the Springfield MRF.

- o To date, 91 of the 101 communities in this region have expressed interest in participating in the Springfield Materials Recycling Facility (MRF) Program. In addition, the Town of Athol, part of the DEP Central Region, has also expressed interest in joining the program. Of the 92 communities interested in the program, Beckett, Greenfield, Leydon, Montague, Sandisfield, Tryingham, and Wilbraham are on a waiting list pending availability of additional capacity at the Springfield MRF.

Eighty-five communities are currently committed to bringing their recyclables to the Springfield MRF, and the majority of those have passed mandatory recycling ordinances. All communities must pass a mandatory recycling ordinance as a condition for participation in the MRF program. The MRF, scheduled to open in January 1990, will divert 60,000 tons per year of paper, glass and metal containers from the region's disposal facilities. Currently, small, local programs are recycling approximately two percent of the region's waste.

- o There are now 10 leaf composting projects in the region. The majority of these projects were first implemented in 1987 with DEP assistance. These facilities are diverting over 5,000 tons of material from area landfills and resource recovery facilities.

Springfield developed a 10 acre compost site adjacent to their waste water treatment plant. Both Springfield and Agawam are using the site for composting. In 1988 Agawam delivered 368 tons of leaves to the site and Springfield delivered 3,700 tons. Due to the large amount of material at the composting facility, a dedicated windrow turner has been employed.

Franklin County has been awarded a \$54,000 grant by DEP to evaluate the feasibility of a regional MSW composting or co-composting facility as part of an integrated solid waste management system that could serve at least 20 of the 26 communities in the county. The feasibility study will include; watershed analysis; review of existing technologies, including their reliability, costs, and comparative suitability; evaluation of potential sites; integration of recycling and leaf and yard waste composting; environmental and public health impacts; economic and compost marketing and utilization analysis; and procurement strategies. The following communities with a combined population of over 58,000 will be included in the study: Bernardston, Buckland, Charlemont, Deerfield, Irving, Gill, Greenfield, Hawley, Leverett,

Leyden, Montague, New Salem, Northfield, Orange, Rowe, Shelburne, Sunderland, Warwick, Wendell, and Whately.

The City of Northampton has been awarded a \$51,570 grant by DEP to evaluate the feasibility of a regional MSW composting or co-composting facility for a 12 town region in western Hampshire County. The proposed site is adjacent to the proposed Northampton landfill. The feasibility study will include analysis of similar issues as were mentioned in the Franklin County write-up. The following communities, with a combined population of over 58,000, will be included in the feasibility study: Chesterfield, Cummington, Easthampton, Goshen, Hatfield, and Northampton.

- o The following three regional facilities are now under or near construction:

1. Springfield Materials Recovery Facility (MRF): This 240\TPD facility will process and market residentially generated recyclables from as many as 700,000 people. It will begin operation in late Fall of 1989.
2. Northampton Landfill: The facility will be expanded to accept waste from Easthampton, and up to ten Hampshire County Hilltowns. These communities have also applied for funding of a feasibility study of siting a co-composting facility at the landfill.
3. Partyka Chicopee Landfill: Approvals have been given for additional expansion of this facility. These add significant capacity for the Region's municipal solid waste.

Chapter 5. CONSTRUCTING THE MASSACHUSETTS INTEGRATED SOLID WASTE MANAGEMENT SYSTEM

This section is divided into two parts. The first describes the substance and purview of the federal and state regulations governing solid waste management. The second describes Massachusetts' programs of technical and financial assistance for the establishment of an environmentally sound integrated solid waste management system.

FEDERAL AND STATE SOLID WASTE REGULATIONS

Federal Regulations:

Current solid waste regulations evolved from water pollution control laws first enacted around the turn of the century and from air pollution control laws of the late 1950's. In 1976, responding to the growing concern about the effects of improper solid waste management, Congress passed the Resource Conservation and Recovery Act (RCRA). Subtitle D of this Act requires that states develop comprehensive plans for solid waste management. It also requires EPA to set criteria and standards for the construction and operation of sanitary landfills. To date, EPA has not promulgated final subtitle D standards.

Massachusetts Permit Process:

Solid waste facilities are subject to a three-part permit process: the Massachusetts Environmental Policy Act (MEPA), administered by the Executive Office of Environmental Affairs; the Site Assignment process, administered jointly by the relevant local boards of health, DEP and DPH; and, finally, the Solid Waste Management Facility Permit review process administered by DEP.

The purpose of the MEPA process is to ensure that all environmental issues associated with the proposed project are reviewed, alternatives to the proposed project are considered and mitigation measures are developed, where necessary. In the MEPA process, proponents must submit an Environmental Notification Form. If the proposed project meets certain daily

tonnage thresholds as laid out in 301 CMR 11, or as determined by the Secretary of Environmental Affairs to pose a significant threat to the environment, the proponent must submit an Environmental Impact Report (EIR). Public input is encouraged during the development of the scope and the comment period for the draft and final EIRs. The MEPA process requires the proponent to respond to all comments received on the draft in the development of the final EIR. The Secretary of Environmental Affairs evaluates the final EIR and issues a determination as to whether it adequately addresses all environmental concerns associated with the project. When a positive determination has been made, the proponent proceeds with the site assignment and permit application process.

The Solid Waste Act of 1987 mandated changes in solid waste facility siting process and standards so as to establish a uniform and comprehensive process. In the new process DEP and the Department of Public Health review proposals for technical merit and impact to public health. The local board of health then considers DEP and DPH determinations in making its own decision. Localities retain the ultimate responsibility for siting decisions, but DEP and DPH do have the authority to reject any application that does not meet state standards. Pursuant to this mandate, DEP promulgated regulations, 310 CMR 16.00, governing the site assignment process in 1988. Major changes from the previous process include:

- o requirement that the MEPA process be completed before any application is reviewed;
- o requirement that DEP issue a technical report for each site assignment application, stating whether or not the site meets the site suitability criteria;
- o requirement that DPH review, comment on, and issue a report on the potential public health impacts associated with the facility;
- o requirement that the Board of Health issue a site assignment unless it finds that the site presents a danger to public health;
- o requirement that the applicant pay an application fee, if the Board of Health so requests, to offset costs to the municipality of reviewing and evaluating the application;
- o establishment of a rigid time frame for each step of the review process;
- o provision allowing parties adversely affected by the decision of a Board of Health to appeal the decision directly to the courts;

- o requirement that landfills and waste combustion facilities incorporate recycling and composting into the overall design; and
- o requirement that siting, size, and design of the facility be consistent with the Master Plan.

A proponent may apply for an exemption from the site assignment process based on the following premises: 1) the proposed facility will only accept pre-sorted recyclable or compostable materials; 2) the operation is capable of protecting the public health and the environment; 3) the operation will result in a beneficial product and 4) the operation is not a solid waste management facility. When an exemption is granted, DEP, in consultation with the local board of health, will add any conditions to the proponent's operating plan deemed necessary to ensure that public health and the environment will not be endangered.

Through the amendment of existing regulations the Department is creating the regulatory structure which protects public health and the environment and will promote the creation of an integrated solid waste management system in Massachusetts. The proposed regulations utilize a new framework intended to expand and clarify existing regulations, codify existing policies and practices, and incorporate new regulatory provisions in accordance with legislative mandate.

The first part of the regulations applies to all solid waste management facilities. It contains the permit approval process and criteria as well as other requirements common to all facilities. The other parts of the regulations represent the design criteria and operational standards for each type of solid waste management facility: sanitary landfills, transfer stations and solid waste combustion facilities. Still to be drafted are the design and operational requirements for recycling and composting facilities.

Massachusetts Solid Waste Facility Regulations

The proposed regulations establish a carefully prescribed application process and clearly delineate the criteria by which DEP will make a decision to grant or deny the permit application. The review process for new facility permits involves a completeness review (60 days); an initial permit review and draft permit decision (120 days), comment period (30 days) and final review and issuance or denial of the permit. One of the objectives of this endeavor is to link the permit approval process to the Master Plan. Accordingly, one permit approval criterion requires the proponent of the facility to either recycle or to provide other means by which a minimum of 25% of the waste in the proposed facility's service area will be

recycled. As part of calculating the percentage that is to be recycled the proponent must identify the proposed facility's service area and submit an analysis of the waste stream that is anticipated to be accepted by the facility, including the percent of recyclables in the waste stream and the extent of current recycling efforts.

The Department may also require that a specific facility or class of facilities prohibit or limit the disposal of particular types of solid waste material in order to reduce the potential adverse environmental impact of a facility or to extend the useful life of a facility. According to the proposed regulations the following types of solid waste materials will be banned from disposal facilities except under certain clearly delineated circumstances; leaves and yard wastes, automobile batteries, discarded tires, and white goods. DEP is developing the implementation plan for these bans.

The Department is currently developing compost and organic materials reuse regulations, expanding upon 310 CMR 32.00 (the Sludge Land Application Regulations) and the federal sludge regulations. In 1988, DSWM staff completed research to guide revision of regulations for siting and operating compost facilities. DEP determined that two types of composting operations, if conducted properly, do not threaten the public health and safety of the environment:

- o all composting units located on farms that handle only approved materials; and
- o leaf and yard waste composting operations.

These two types of facilities have been granted an exemption from the site assignment process and from the DEP General Solid Waste Facility regulations. These exemptions encourage the rapid development of these types of composting operations.

Farm composting operations are under the general oversight of the Department of Food and Agriculture (DFA). In conjunction with DEP, DFA has developed a registration program and is offering a \$3 million grants and technical assistance program for farm composting operations.

Proponents of leaf and yard waste composting operations must register with DEP. This simple process allows DEP to monitor the operation. DEP retains the authority to require modifications or close leaf and yard waste composting operations that create a nuisance and present a threat to the public health or safety or the environment.

Current landfill regulations, 310 CMR 19.00, were

promulgated in 1971. While the regulations do contain a performance standard prohibiting landfills from polluting the groundwater, they reflect a limited understanding of the potential environmental impact of landfill leachate and contain no facility design criteria. Over the last decade, the Department has moved to require that all new landfills be equipped with liners, leachate collection systems, and groundwater monitoring systems. Because the regulations are antiquated, DEP has used policy to clarify and modify the regulations to reflect improved environmental protection standards.

During 1988, DEP committed these policies to regulatory format, establishing design standards for landfills which incorporate technology to prevent the discharge of leachate into the groundwater, and which modify and expand operation and maintenance procedures and practices to ensure efficient use of the landfill space and overall environmental protection. Operators of these facilities must submit documentation that they are in compliance with the requirements of the regulations. Failure to submit the required documentation will result in the facility being considered out of compliance. Operators of landfills located within a Zone of Contribution (Zone II) to a public water supply well must submit their filings within one (1) year of the effective date of the proposed regulations and all other facilities must submit their filings within two (2) years. All landfills that are located within a Zone II must close within five (5) years of the effective date of the regulations.

DEP recognizes that landfills may also create air quality problems. However, since only limited data exists, DEP has not yet written landfill-specific air regulations. Instead, a section of the facility regulations has been reserved for future articulations of air quality control standards.

Currently there are no solid waste regulations which govern the design or operation of solid waste combustion facilities. The Division of Air Quality Control regulates such areas as boiler design, air quality control equipment, air modeling, and emissions standards, while the Division of Water Pollution Control regulates any discharge of pollutants to surface or groundwater. One of the purposes in drafting these solid waste regulations is to codify existing operation and maintenance requirements which are currently in the form of Division policies, replacing the Division's Ash Disposal Policy and the Ash Sampling and Analysis Policy. The regulations will also prescribe ash testing and handling protocols and requirements. Under the new regulations, DSWM will also regulate these facilities with respect to solid waste planning, including the mandatory recycling requirement, waste bans, ash management plans, and operational issues such as storage of solid waste or recyclable material, dust, fires and facility shut-downs.

TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS

Public Education

DEP is developing public education programs on regional recycling, environmental enforcement and other solid waste management issues. These programs to inform and engage the public are critical to the successful construction and management of the integrated waste management system described in this plan.

DEP's Division of Solid Waste Management and the Center for Rural Massachusetts (CRM), at the University of Massachusetts in Amherst, have joined efforts to develop an extensive recycling public education campaign. In the first year these efforts focus on the Springfield MRF. The ambitious plan includes producing educational brochures, guidebooks and audio-visual presentations which will describe how the recycling center operates and how communities participate. This outreach will include local training conferences for community recycling coordinators. By September, 1989 DEP will provide a solid waste school curriculum to Western Massachusetts schools for grades K-12.

DEP will link issuance of new solid waste regulations and policies to an extensive public awareness effort. Release of each part of the regulations will be paired with informational meetings and public hearings. Public hearings on regulations and policy and technical reports are intended to establish sophisticated interaction with the public on scientific concerns relative to solid waste management.

Source Reduction

A primary objective of the Commonwealth's integrated solid waste management system is to limit the amount and toxicity of waste generated in the future through source reduction initiatives to change manufacturing and packaging design and adjustments in consumer behavior. The state has established a goal of reducing the waste stream by 10% in the year 2000. By reducing the pace at which waste is produced and reducing the toxicity of the remaining waste stream the Commonwealth can relieve the pressure on all other elements of the solid waste management system.

Reducing the amount and toxicity of material that is discarded requires cooperation at many levels. DEP calls on citizens of the Commonwealth to assume responsibility to learn about the products and packaging they buy and the waste they create. Consumers should avoid products that contain or are packaged in material containing hazardous constituents and they should try to buy products which are or are packaged in materials that are recyclable. For their part business should

conduct source reduction audits to find ways in which operations could be altered to generate less waste or, if possible, reuse waste by-products that would otherwise enter the solid waste stream. The Department's current role is one of education and technical assistance, while economic incentives for source reduction are being entertained by the Legislature.

An obvious focus of solid waste source reduction efforts is containers and packaging materials. While one dollar of every ten spent on food pays for packaging, approximately 90% of all packaging material is discarded, much of that before the product is ever used. The discarded packaging accounts for almost one-third of the solid waste stream. In Massachusetts this accounts for approximately 2,000,000 tons per year. Many view this as excessive, particularly when examining the disposal problems associated with the materials used for packaging.

Equally important in addressing the issue of excess packaging is the need to educate the public about the impact of the use of disposable products. Consumers have grown used to the convenience of a range of products described as disposable, such as diapers, paper towels, razors, cameras, and eating utensils. Now that we are faced with a shortage of solid waste management capacity consumers are responding to a new manufacturing trend by purchasing biodegradable products. However, these products are not a panacea. Biodegradable products do not relieve the burden on the solid waste management system. The amount of waste that must still be handled and landfilled or burned does not decrease with the use of these products. Secondly, biodegradable products offer no advantage if the waste is incinerated and when placed in landfills even biodegradable products do not readily degrade.

Minimizing the amount of toxic constituents that enter the waste stream is important in making the other elements of the waste management system safer. The Department recognizes the importance of a strong household hazardous waste management program that stresses consumer education and source reduction, as well as, collection and proper disposal.

Currently a bill is pending, H-1783, entitled "An Act to Protect the Environment by Encouraging Reduction and Recycling of Packaging in the Commonwealth". The Department strongly supports this bill, sponsored by Representative Mark Roosevelt, which assesses a three cent fee on packaging on products sold within the Commonwealth unless such packaging is made of 50% recycled materials or unless the predominant material in the packaging is being recycled at a rate greater than 30% up to 1993 and 50% thereafter. This Bill provides for deposits on motor vehicle tires and batteries, and establishes special conditions on the collection of used oil and the disposal of white goods. It also prohibits sale of foamed polystyrene products manufactured with chlorofluorocarbons.

Executive Order #279 which was signed by Governor Dukakis on May 18, 1988 complements this bill. The Executive Order's purpose is to ensure that the Commonwealth does not purchase products whose manufacture has been shown to cause significant harm to the environment, and to use the purchasing power of the Commonwealth to promote recycling technologies. It requires the State Purchasing Agent, to the extent practicable, to purchase recycled products, including paper, aluminum, plastic products, and soil supplements. The Order restricts the use of disposable polystyrene foam products and requires procurement regulations to be developed that promote the use of recovered and recycled materials. Moreover, regulations ban state agencies from purchasing disposable polystyrene foam products which are manufactured using chlorofluorocarbons (CFCs). CFCs have been linked to the deterioration of the atmospheric ozone layer.

State government's favored procurement of recycled materials will have the two-fold effect of increasing both the demand for recycled products, and their quality and availability. The state procurement plan focuses on paper in the spring of 1989, aluminum and composted materials in 1990, and plastics in 1991. This will, in turn, create a climate where local governments as well as industry will have greater incentive to purchase recycled products.

Waste Diversion

Waste diversion describes reuse of the valuable components of the solid waste stream through recycling and composting. DEP will spend at least \$60.5 million of Ch. 584 funds to generate efficient collection, processing, and marketing of waste diversion products. It will do so through sponsorship of the Regional Recycling Program, Capacity Development Program, local recycling grant program and Compost Program. The following table describes the minimum funding allocated to solid waste diversion programs.

Figure 5 - a
Recycling and Composting Initiatives in Massachusetts

<u>Program</u>	<u>Funding</u>
Regional Recycling Program (facility development and equipment grants)	\$ 30.00 M
Capacity Development Grant/Loan Program . . . (30% of program funds earmarked for recycling and composting facilities)	\$ 21.00 M
Local recycling grant program	\$ 2.50 M
Compost Program	\$ 7.00 M
TOTAL	\$ 60.50 M

In addition, DSWM is actively promoting recycling through use of economic development and regulatory tools, by support of significant legislative initiatives, and through the development of educational materials. The Massachusetts Industrial Finance Agency (MIFA) is also effective at promoting the DEP's waste diversion initiatives. In 1989 it made its first financial commitments for tax exempt bonding to proponents of waste diversion facilities. DEP will continue to work with MIFA to make such funding available both to attract industries using recycled feedstocks, and to finance development of recycling, composting and MSW processing facilities.

For recycling to be economically viable, steady flows of large quantities of recyclable materials of a consistent quality

from the producer (municipalities) to the industrial consumer (manufacturing facility) are required. States with the most successful recycling programs have addressed this need by mandating state-wide recycling. In Massachusetts, the strong home-rule tradition combined with the constraints of Proposition 2 1/2--which prohibits state mandates without full state funding of all associated costs--have effectively stalled the use of this strong legislative tool.

Before 1983, recycling as an alternative to disposal was very limited in scope because of a frustrating closed-loop set of circumstances. Citizen participation was spotty. The relatively few local recycling programs relied upon the volunteer efforts of a few committed people. This generated small volumes of materials of variable quality. As a result, markets for recycled materials were weak. It did not pay for material end-users or brokers to purchase small amounts of materials that might be contaminated or poorly sorted. This meant very little return to the programs.

Regional Recycling Program (RRP)

Nearly four years have passed since the announcement of the Massachusetts Regional Recycling Program (RRP). The RRP aims to provide the end-user with large quantities of recyclables of consistent quality. To this end, the program calls for the development of large recycling centers for the collection and processing of recyclable materials. These centers, called materials recovery facilities (MRFs), were to be sited in twelve areas across the Commonwealth. The original plan called for state development of at least five MRFs by 1993. These facilities were to be state-financed and owned, and privately operated. While the general concept of regional MRFs is a sound one, development of these facilities has proven to be a complicated matter.

Although interest in the RRP grew quickly, the program experienced severe delays and cost over-runs. For example, the first facility to be built under this plan, the Springfield MRF, will not begin operations until 1990. Initially the Springfield MRF was delayed by the lengthy battle to secure state-funding and passage of the 1987 Solid Waste Act. Then, it was more seriously delayed by the legal constraints imposed by the public bidding and procurement requirements. Subsequently it has become obvious that there is not enough funding to develop the original five - let alone the 12 planned - MRFs in the same way that the Springfield MRF was developed.

In this report, DEP presents a modified vision of the state's role in promoting the development of recycling that is intended to provide a leadership framework within which our public officials can achieve an effective partnership with DEP and the private sector. DEP's new strategy incorporates the

lessons learned in implementing the original RRP plan and responds to a rapidly changing environment for recycling.

The problems for MRF development caused by the inflexibility of the public bidding and procurement requirements forced DEP to revise its RRP development model. This revision has been greatly aided by the growing support, from both municipalities and the private sector, for recycling as a waste management method. For example, WTE and North Shore Fiber have just announced a joint venture for a recycling facility, intended to serve some or all of the NESWC communities. North Shore Fiber supplies several paperboard manufacturing mills in Massachusetts and its position in the paper industry puts them in a good position to handle newspaper, which has been a difficult commodity to market in recent months and will continue to be so in the near future.

DEP's new model envisions municipalities electing to enter into a service contract for regional scale recycling services. The contracts result from a public entity issuing a request for services. Proposers respond by submitting written and sealed proposals demonstrating their technical ability to provide the requested services and the terms under which they would be willing to deliver such services.

DEP intends for this full service contract model to become the primary MRF development tool in the Commonwealth. It permits flexibility in selecting the MRF technology and operator, thereby promoting a competitive environment in the growing recycling industry, and it improves accountability between communities and the service provider.

This new policy accelerates development in regions already considering or evaluating private MRF proposals and, with the changes discussed below, will also enable development of state-owned facilities.

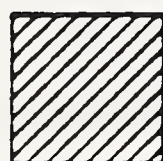
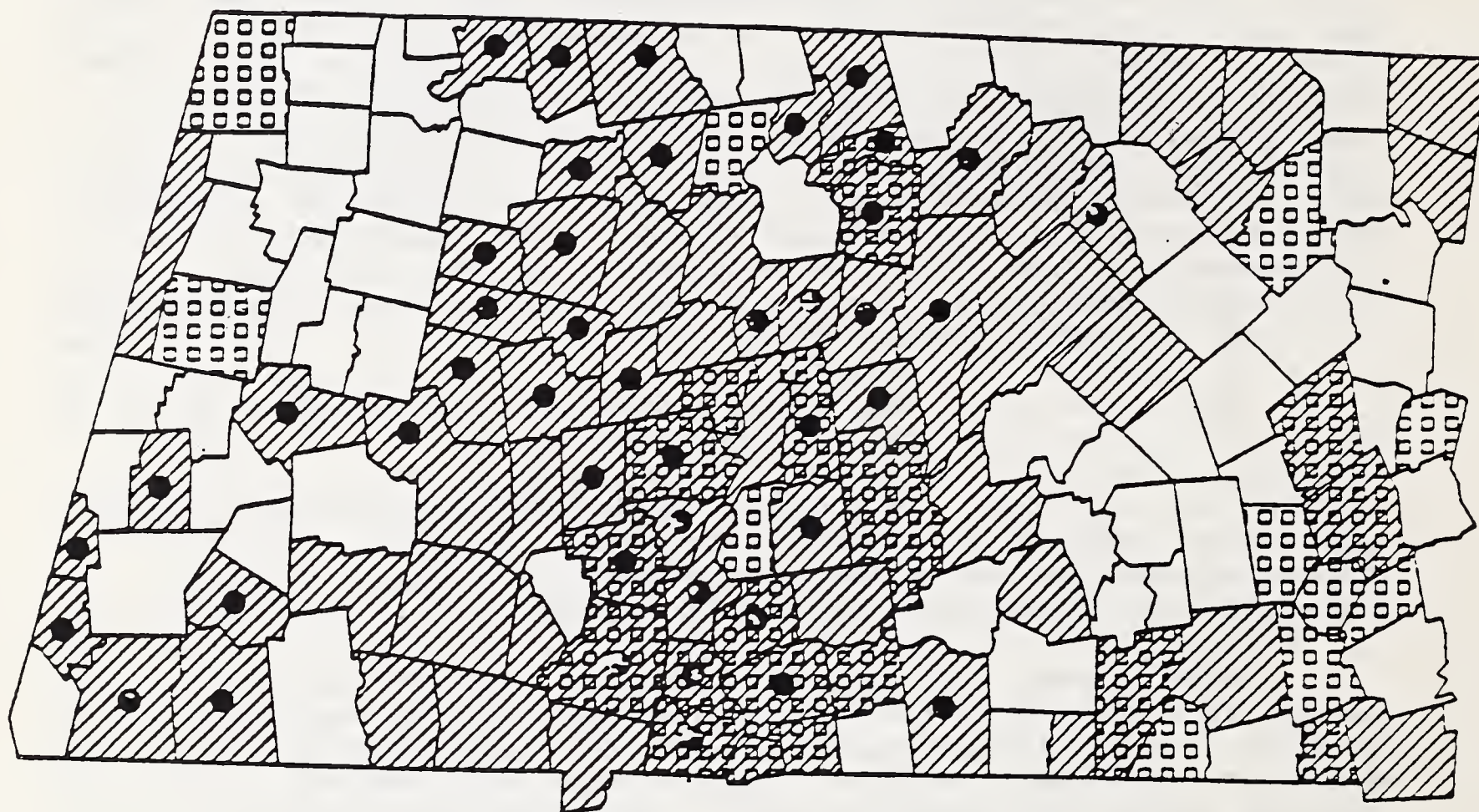
The revised Regional Recycling Program promotes five objectives:

- o the formation of regional entities;
- o procurement of service providers;
- o design and implementation of recyclables collection programs;
- o facility siting; and
- o equipment grants.

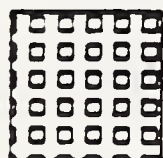
Formation of Regional Entity

Regional approaches are clearly the proper approach to issues such as solid waste management, and the Legislature has

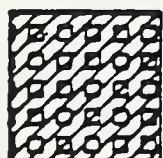
Massachusetts Recycling



Recycling



Composting



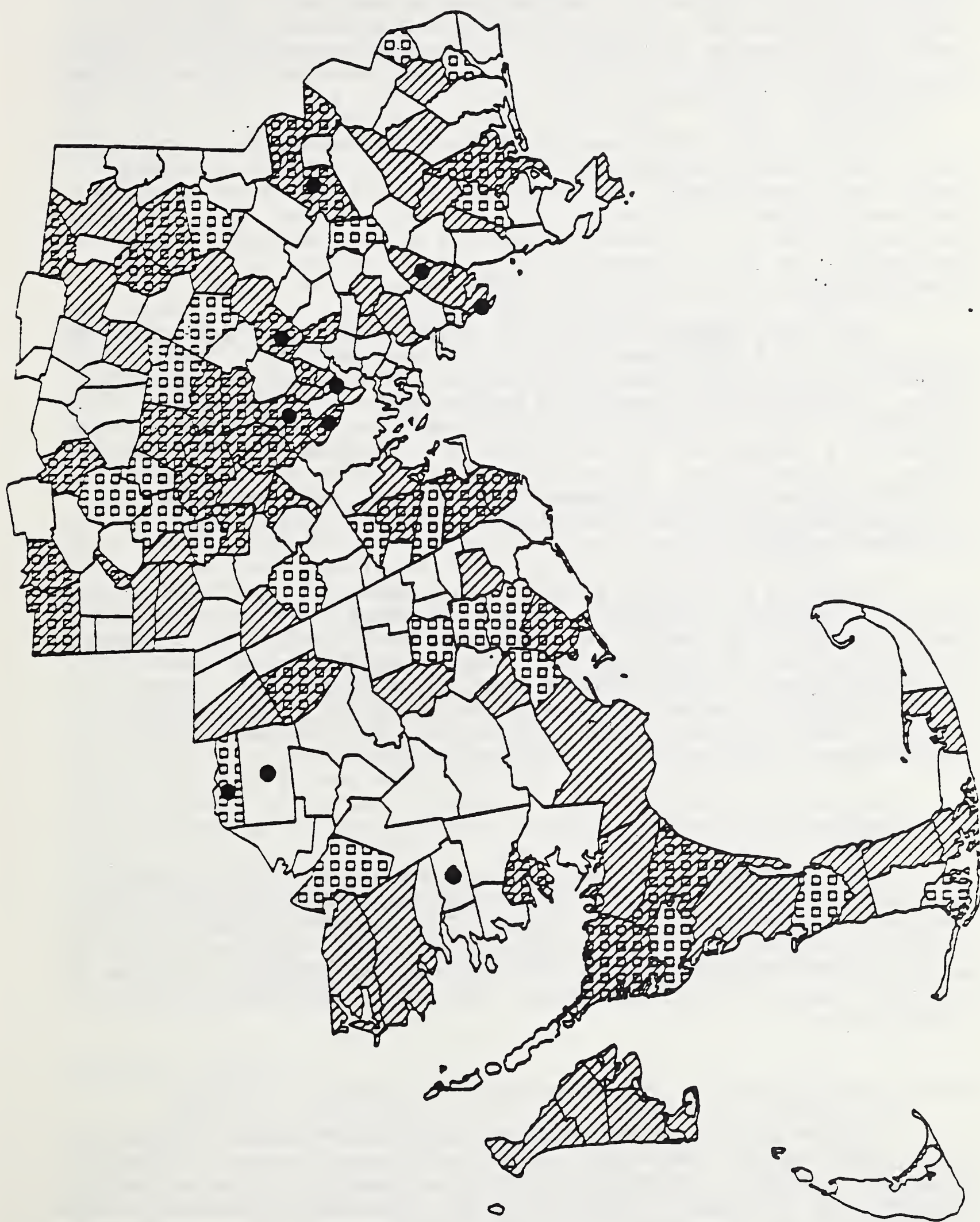
Recycling and Composting



Municipalities Which Have Passed
a Recycling Ordinance

and Composting, 1988

(77)



deliberately structured the grants and loans provisions of the Solid Waste Act to encourage regional solutions. Yet, with certain exceptions, Massachusetts lacks a tradition and a political or legal structure to which municipalities can readily turn that will provide the political and economic infrastructure for regional solutions.

DEP works with communities in this and other of its solid waste management programs to help them identify their mutual solid waste management interests and put in place the necessary infrastructure to act regionally. In some cases, this structure may be filled by an existing regional entity such as county government or by the formation of a new one such as a solid waste district or a recycling consortium.

As one example, the Millis Consortium developed under the leadership of a Selectman from the Town of Millis. After several months of persistent attempts to interest surrounding towns in approaching recycling as a group, the Consortium contacted DSWM for assistance and direction. DSWM has recently retained a consultant to recommend an approach to fulfilling those municipalities' recycling needs. Following the study, it is anticipated that a number of those towns will establish an Intermunicipal Agreement and issue an RFP in the manner discussed above.

DSWM is providing similar assistance to the Central Mass Resource Recovery Committee and to the Cape Cod communities. Regional Planning Grants to the South Shore Coalition, Franklin County and the Northern Berkshire Disposal District will likewise provide a structure by which municipalities can identify mutual needs and coordinate activity on a regional basis. DSWM will recommend substantive provisions and model agreements to accomplish the following goals.

Procurement of Service Provider

Where significant commitment to a regionalized approach is demonstrated, DSWM will assist interested communities and regions in the coordination and development of requests for proposals (RFPs) and their related documents. This will include advising the communities on its contents, selection criteria, contract terms and alternatives, and other documentation as appropriate.

Design/Implementation of Recyclables Collection Program

There is no one solution to collection issues. Six contiguous communities may each have different waste hauling, disposal methods, and contractual arrangements. Once a regional approach is in place, DSWM will assist and advise municipalities on alternative approaches to collection issues. Such assistance

could include determination of equipment needs, route layout and implementation for those municipalities interested in performing pickup services or advice on contract provisions and selection criteria for those municipalities wishing to contract for those services. For communities which do not intend to provide curbside service for recyclables, DSWM will assist in the design and layout of an effective dropoff program. Model recycling ordinances and recommended enforcement options will also be available.

Facility Siting

Siting is one of the most critical issues in regional development. Since hauling costs are such a large component of the overall cost of recycling, facility location will have a significant impact on the relative overall costs to the participating communities. In addition, the scarcity of viable sites, especially in urban areas, is one of the greatest obstacles to large-scale recycling in high population density regions.

Where no viable sites are readily available, DEP, using its authority under Massachusetts General Laws, can search for and obtain strategically located and environmentally suitable sites to be made available to a vendor selected by the participating communities. This achieves several desirable objectives. First, services can be steered to a desirable location for service to the region. Second, a leasing arrangement between the public land owner and the operator provides a means to maintain significant controls over the facility. Third, if DEP provides a site already assigned for solid waste use, it will both expedite the development process and reduce the risk to the operator. Fourth, state assistance in this manner serves as a subsidy to the participating communities. Where land purchase and permitting costs that would otherwise be underwritten by the vendor are borne by the state or a host municipality, the lower costs to the vendor are realized as savings to the communities in the form of a more favorable service fee agreement. Finally, providing a publicly owned site as a component of an RFP opens competition for recycling services to vendors which might not otherwise be able to locate a viable site in the area within the timeframe required by the RFP.

Equipment Grants

DSWM will continue to provide funding to communities participating in regional facilities to offset the costs of collection equipment, subject to the availability of funding. To complement this effort, private businesses, wishing to demonstrate their support for the state's recycling initiative have expressed their interest and willingness to make donations

to cities and towns for the purchase of equipment. Every regional initiative should include solicitations from industry for sponsorship of recycling equipment.

Program Flexibility

While the service contract model will respond to the need for efficient program development in areas of the state already considering large-scale recycling, it is possible that there will be areas slow to marshal the level of commitment and cooperation needed to trigger this model. Therefore, to preserve the Commonwealth's ability to meet the needs of these situations, DSWM will pursue legislative exceptions to the state bidding laws to facilitate more efficient and competitive public construction of MRFs, if necessary. In addition to the initial funding of \$30 million for MRF development under the Solid Waste Act, DSWM will make additional grant and loan funds in the Solid Waste Act available for facility development. It is anticipated that the capacity development grant funds will be allocated to the regions of the state where the private sector interest is minimal or offered at relatively high cost to the public.

The prime advantage of this model is that it allows regions to make their own decisions about vendors and solutions, and thus ensures direct relationships between waste generators and those firms providing processing and/or disposal. Second, the private sector has flexibility, the ability to incur risks, and the ability to respond to changing circumstances that cannot be duplicated under a public ownership scenario. Third, it limits the state development role to what it can do best (i.e. provide siting assistance, make grants, and provide technical assistance), and will, therefore, expedite the development process.

Plastics Recycling

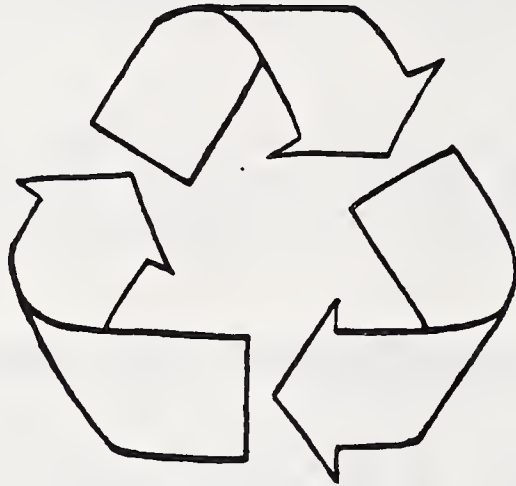
DEP's waste minimization initiatives focus on components of the municipal solid waste stream which are traditionally difficult to safely dispose of or recycle. For example, for reasons outlined below, it is important to remove plastics from the waste stream but recycling of this material has become technically viable only in the last few years.

- o Although a small percentage of the waste stream by weight, plastics can be as much as 25% of the waste stream by volume, and it is volume, not weight, that depletes landfills.
- o Plastics are manufactured from gas and oil, non-renewable resources which can be conserved through recycling.
- o Improper disposal of plastic waste in our oceans and waterways is estimated to have killed 100,000 marine mammals last year, in addition to polluting our beaches.
- o Plastics do not biodegrade, but remain intact in landfills indefinitely.

To address the problem of plastics recycling, the Commonwealth, in cooperation with Rhode Island, developed the Plastics Recycling Action Plan (PRAP). Published in July, 1988, the PRAP is already seen as a national model. Calling for the collection, processing and marketing of 45% of discarded rigid plastics, the plan lays out four specific steps adopted by the DEP for the incorporation of plastics into the MRF.

First, since collection of plastics is difficult because of the material's high volume-to-weight ratio, the Commonwealth will develop two collection pilot programs. One will target rigid containers, the other will collect both rigid, and film products. Both programs will evaluate collection vehicles, densification methods and equipment capacity. Second, to ensure continuing research and development, the Commonwealth has helped establish the Plastics Recycling Applied Research Institute (PRARI), a public/private consortium at Lowell University. PRARI's first project was funding the development of N.E. CRInc's ET/1 mixed plastic extrusion process. The Institute will soon evaluate the markets for the plastic lumber produced by the ET/1 process. Third, the Department is integrating plastics into the regional MRF model as collection and

separation technologies are proven. Fourth, market development efforts to attract the Commonwealth's industries which process and remanufacture plastics into the Commonwealth are already underway. The Commonwealth has been active in promoting the location of plastic recycling facilities in the state. High-value markets appear to be ready for polyethylene terephthalate (PET) and high-density polyethylene (HDPE). The Regional Recycling Program is putting the necessary programs in place--collection, processing, research and development, and marketing--to make large-scale plastics recycling a reality



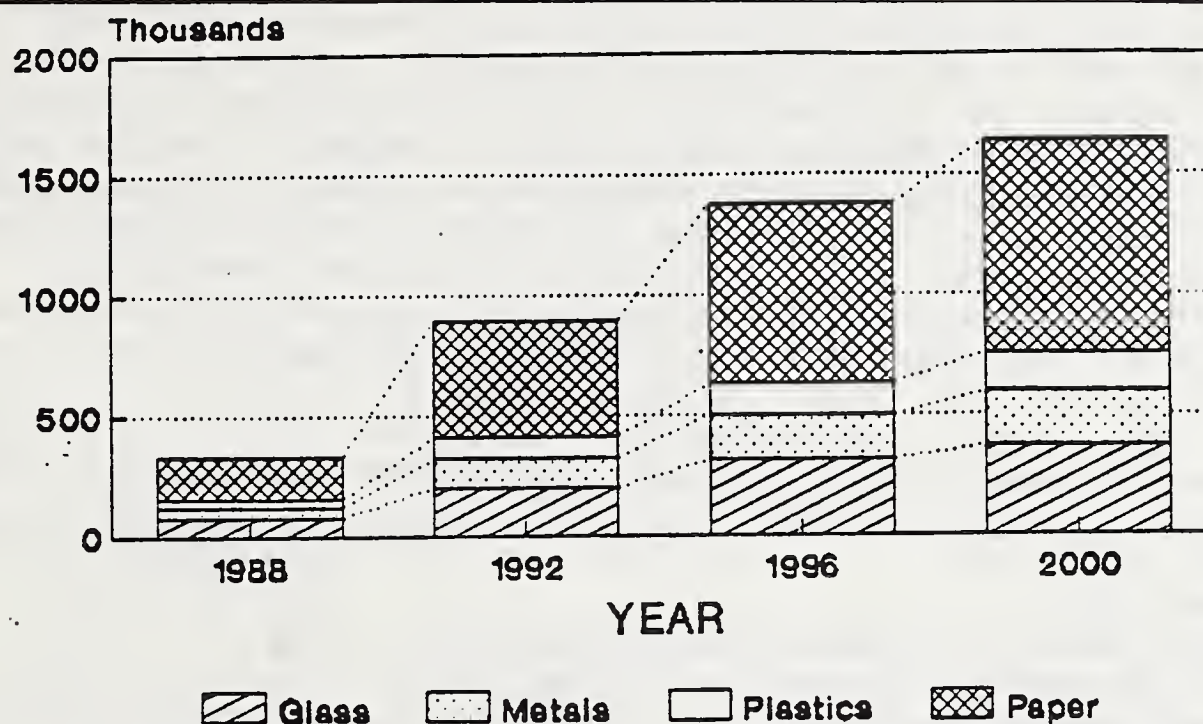
Recycled Material Market Development

The three arrow recycling symbol stands for the three phases of recycling: collection, processing and reuse. The Regional Recycling Program's MRF development initiatives address collection and processing. DEP's Market Development efforts anticipate and respond to the needs of reuse.

In order for recycled materials to be reused, they must be re-manufactured into desirable products and resold to consumers. This process invariably calls for industrial firms to accept recycled materials as raw materials. The discussion of market development, therefore, requires an analysis of the quantity and quality of recycled waste as a raw material and of industrial capacity to accept recycled material into their factories.

As figure 5-b shows, by the year 2000 the Commonwealth will generate 1.6 million tons per year of recycled material. Roughly 53 per cent of this will be paper (including mixed paper, newspaper, and corrugated cardboard), 23 per cent will be glass, 14 per cent will be metals including aluminum, and 10 per cent will be plastics.

Figure 5-b
Recycled Composition
1988 -2000



Source: 1989 DEQE Estimates

These quantities of supply represent enough feedstock for a total of at least 5 different factories requiring capital investment of over \$1 billion and the potential to create 1000 jobs. As the chart further shows, these supplies of material will come on line in a stepped fashion, thus permitting orderly development of markets. However, it is critical that market development efforts begin now in order to prevent huge market problems in the future.

The potential for market dislocations is already real. In March, 1988, a community collecting used newsprint could expect to sell that commodity for about \$35 per ton. Due to increases in recycling activity and their corresponding increase in supply of used newsprint as well as export difficulties and a strike at de-inking mills in the western United States, that price had dropped to zero by November and, in some cases, communities were required to pay to have their recycled newsprint moved.

Paper is, and will be, the most problematic recycled commodity from a marketing standpoint. The reasons for this are several. First, it has the lowest value; second, because there are 50 different grades of waste paper traded in the commodity markets, it is the most difficult to sort; and third, unlike glass and aluminum, it is not immediately attractive to manufacturers as a feedstock. Moreover, paper making is an expensive business. A newsprint recycling mill will cost between \$300 and \$400 million to construct and, because of the

high break-even points in the industry will need to operate at 85% of capacity in order to profit.

The value of recycled paper is related to several factors: the quality of the pulp in the paper, the level of contamination in the recycled paper, the ability to re-manufacture the paper into new products, and the availability of mills to accept the recycled paper. As an example, a piece of computer printout, made from bleached chemical pulp, can be remade into a number of different grades from high-quality paper down to paperboard. On the other hand, a piece of used newspaper, made from unbleached groundwood pulp, can only be used to make new newsprint, paperboard or cellulose insulation. The more limited markets for newsprint decrease its value and saleability.

Figure 5 - c
Massachusetts supply of recycled paper in the year 2000

<u>Type of Paper</u>	<u>Quantity</u>
Newsprint	663,800 tons
Mixed Paper (composed of a variety of household paper including mail and magazines)	147,500 tons
Corrugated Cardboard	73,700 tons

Corrugated cardboard represents the least problematic of these three commodities because manufacturing technology readily accepts it as a feedstock due to its high fiber quality and the relatively small amount of printing typically found on these containers.

Mixed paper presents marketing problems due to the variety of different pulp types and printing levels contained in the materials. While mixed paper could be separated into different grades, given the volumes present at a MRF, it is not economically feasible to do so. Therefore, mixed paper grades will generally be marketed to the paperboard industry and exported overseas where cheaper labor enables greater separation.

Newsprint represents the largest volume of any recycled commodity and the greatest marketing problems. Its uses are limited and the quantities are great. The best use of recycled newsprint is to re-manufacture the material into new newsprint. This requires the construction of a de-inking mill and the development of acceptance among newspaper publishers for the end product of these mills.

An alternative for used newsprint is to utilize it for the manufacture of paperboard. While substantial paperboard manufacturing exists in Massachusetts--3 mills with 185,000 tons per year capacity--supplies of newsprint will exceed demand at these mills.

As a result of the lack of re-manufacturing capacity for used newspapers in the Northeast, most of the incremental volumes being collected are exported to overseas markets. These markets exist primarily in the Pacific Rim and secondarily in South America and Europe. Waste paper was the single largest export from the United States in 1987, totalling over 4 million tons. For materials generated in Massachusetts, however, the lack of direct shipments from Boston to the Far East creates the need for recycled exports to be transferred to the port of New York for transshipment to overseas carriers. This generates further downward pressure on prices.

Glass will represent approximately 25% of the recycling stream in Massachusetts or about 300,000 tons per year. Recycled glass that has been crushed ("cullet") is readily accepted into commercial glass furnaces as a feedstock. If the cullet is free of contaminants, it is considered an acceptable, even desirable, alternative to sand, soda ash and limestone (the basic raw materials of glass making).

Quality is the touchstone upon which glass recycling must rest. Glass furnaces are highly intolerant of contaminants such as metals, ceramics and plastic. In addition, for recycled glass to be fully useful to manufacturers, it must be separated by color. While clear, or flint, glass may be used to manufacture any other color of glass, brown (amber) and green cullet are suitable in large quantities only for new brown or green glass.

Massachusetts currently has one glass plant manufacturing approximately 150,000 tons per year of product. Its current use of cullet is estimated at 20% (30,000 tons per year). Conversations with the plant manager indicate that increasing cullet usage to 50% could be done today and that usage in excess of 75% is possible with relatively small amounts of capital investment. In addition, markets for recycled glass are emerging in the areas of fiberglass manufacturing and in the use of the material as a substitute for aggregate in road building.

Glass plants, to increase their intake of cullet over 50% of raw materials, need to install front-end beneficiating equipment to clean the glass and remove impurities. The Department will work with both the management of glass plants and the Executive Office of Economic Affairs to facilitate the investment in this equipment.

Metals to be collected in the regional recycling facility are primarily tin-plated ferrous (tin cans) and aluminum. These are radically different commodities and must be dealt with differently.

Aluminum will represent approximately 0.5% of the recycling stream in Massachusetts or about 70,000 tons per year. This number is an estimate and could vary greatly as most

of the household aluminum comes in the form of beverage cans which are covered by the beverage container law (bottle bill). Therefore projections of aluminum capture will vary depending on the amount of can scrap that is recycled from households as opposed to being redeemed for deposits.

The primary driver of aluminum recycling over the past twenty years has been the aluminum can industry. Using recycled cans as an alternative to smelting new aluminum from bauxite creates both operational efficiencies and cost savings. Therefore the use of recycled aluminum will continue to be a preferred alternative to virgin material in the production of new can stock. While there are no aluminum smelters in Massachusetts, there exists enough capacity in the New England region to accept all of the quantities generated through the RRP.

Tin cans will represent approximately 15% of the recycling stream in Massachusetts or 180,000 tons per year. Tin cans are composed of roughly 1% tin (used as a coating) and 99% steel. Tin currently has a value of around \$10,000 per ton, steel is around \$100 per ton. Therefore, to capture the value of the tin in a can the primary market for the material is a detinner.

Detinning is the chemical separation of tin from steel. After being separated, the two materials are marketed to different manufacturers. The closest detinning capacity to Massachusetts is in Pennsylvania and Maryland. The key issue with tin plate scrap is therefore market availability but the cost of transportation to that market. Discussions with the management of AMG Resources, the primary detinner in the Northeast, indicate that they will be willing to locate a plant in the Northeast when supplies are in excess of 25,000 tons per year. This will occur in Massachusetts around 1992.

Based upon the above analysis of supply and demand, paper emerges as the most pressing market development need. The current price dislocations, especially in the area of newsprint, are threatening the viability of local programs and could present real problems as the MRF program comes on line.

Therefore an immediate focus of the Commonwealth's market development program is on easing the current pressure on recycled paper markets. The Department's approach to this is twofold. First, as the readiest market for waste paper is overseas, DEP is working to facilitate the export process and to identify new markets abroad for Massachusetts waste paper.

The DSWM is meeting with both MASSPORT and the waste paper industry to develop programs to facilitate exports. Possible solutions being explored are: export coordination, rail transshipment, alternatives to forty-foot containers, and direct negotiation with shippers regarding stable contracts for container availability. In addition, DSWM staff are meeting

with representatives of the People's Republic of China regarding expanding that country's use of waste paper. This program has the potential to both consume large quantities of waste paper and to increase the total level of direct shipping out of the port of Boston.

The second component of developing markets for recycled paper is the development of de-inking mills in the Commonwealth. The DSWM is currently meeting and negotiating with three companies regarding the possibility of their constructing a new mill in Massachusetts. Ranging in size from 50,000 tons per year to 300,000 tons per year, all of the companies are interested in taking advantage of the large volume, high quality supply of recycled paper that will be generated through the MRF program.

Siting and building a de-inking mill will not occur overnight. Capital costs are high, construction schedules are long and resource needs are great. The realistic time between agreement for construction and the opening of a recycled newsprint mill is three years. Given the scope and complexity of these projects, DSWM market development staff are working closely with other state agencies with expertise in various aspects of such a deal. These agencies include The Massachusetts Office of Business Development, the Massachusetts Industrial Finance Agency and the Massachusetts Centers of Excellence Corporation.

In addition to these two means of addressing the paper glut, DSWM has worked extensively with the Purchasing Agent's Division and the Executive Office of Economic Affairs to implement Executive Order No. 279 which provides for state procurement preferences to recycled products. This effort will focus on recycled paper and paper products for 1990.

While ongoing efforts in the paper area are focussed on exports and recycling mills, there are other uses for recycled newsprint. These include cellulose insulation, animal bedding, and, possibly, packaging material. DSWM staff are investigating these alternative uses with an eye toward implementing these uses in state programs. As an example, use of cellulose insulation in state-constructed housing projects is a means of increasing the demand for that product and the consequent demand for used newsprint.

The procurement program will be expanded to large scale purchases of recycled aluminum and compost products in 1991 and to large scale purchases of recycled plastic products in 1992. In addition, DSWM is evaluating the potential to include recycled demolition debris in the procurement program as a means of increasing its recycling rate.

Composting

Composting is a vital part of the Commonwealth's waste minimization strategy. It offers significant environmental and economic benefits and enables communities to make more effective use of already available incinerator and landfill capacity. Composting is a process of biological decomposition of organic matter under controlled conditions. Micro-organisms decompose to a humus substance that can be used to stabilize and enrich soil. It is a versatile process that can be conducted at sites of various size, utilizing varying degrees of technology. The technology used depends on the type and volume of waste to be composted, economic constraints of the project, availability of land, and intended reuse/resale options for the finished product.

Compostable materials represent a large part of the solid waste stream. An EPA study estimates that the quantity of compostable waste available may be as much as 2/3 of the solid waste stream:

Figure 5 - d
Breakdown of Compostable Fraction of Waste Stream

<u>Material</u>	<u>Percent of Total Waste Stream</u>
Paper*	34.8
Yard waste (leaves, grass, shrubs, wood waste)	17.6
<u>Food waste</u>	<u>15.4</u>
TOTAL	67.8

* Also recyclable

The ease with which material can be composted, however, varies with its composition. Leaf and yard waste composting is quite simple; composting food wastes, sewage sludge, or agricultural wastes requires a higher level of technology and skill. Heterogeneous waste streams require more elaborate and expensive equipment to produce a quality product.

The DSWM encourages the development of municipal solid waste composting facilities and will support this and other composting activities by administering a range of programs authorized in Chapter 584, Section 7. DEP activities to promote composting include:

- o research and pilot projects;
- o public education;

- o preparation of guidance documents and policies;
- o technical assistance;
- o coordination with the Department of Food and Agriculture on agricultural composting; and
- o grants to municipalities and regional entities under Chapter 584 ranging from \$5,000 to \$300,000, depending upon the scale of the project.

DEP has embarked on a four-year strategy to develop leaf composting projects. Twenty-five percent of the communities in Massachusetts participated in 1988. DEP has set goals of 50% and 75% for 1989 and 1990 respectively. DEP's primary goal is to divert the majority of leaves and yard waste collected from disposal facilities to compost operations.

The first step in DEP's strategy to encourage composting was to begin pilot programs and research projects. Programs underway in Northampton, Holden, Worcester, Pittsfield, Yarmouth, and Newton, for example, prove that municipalities can successfully compost leaves with minimal technical assistance. The Department conducted a study of collection systems in Newton which analyzes several leaf and yard waste pick-up methods such as vacuum trucks and curbside pick-up in compostable paper bags. Results of the study will be used to provide further guidance to municipal officials in establishing a viable collection systems for leaves. Most communities which have started leaf composting are now interested in expanding their programs to include other kinds of yard waste.

Public education is also a critical component of a successful composting program. The DSWM published a Compost Guidance Document, which sets out basic principles for composting including siting, design, project management considerations, and information on dealing with potential environmental problems and nuisances. Additionally, the DEP regularly sponsors workshops and assists municipal officials and private operators with planning, siting, constructing, and operating compost facilities.

Grants are available to support such programs. In 1989 the Department awarded its first grants for leaf composting projects in 20 communities and \$300,000 for feasibility studies or planning activities for MSW composting facilities in 5 regions of the Commonwealth serving 42 communities. Leaf composting funds can be applied to the costs of designing, siting, constructing, and monitoring composting facilities. For regional yard waste processing facilities, there will be funds for siting and purchase of processing equipment. Feasibility studies and other planning activities for MSW composting will also be funded by state grants, which finance up to 90% of eligible project costs.

As with leaf composting, DEP efforts to encourage local consideration of MSW composting predates the Ch. 584 sponsored compost grant program. Starting in 1986 DEP funded feasibility studies for MSW composting at two facilities located in the southern Berkshires and in Belchertown. A Southern Berkshire compost facility would provide up to 14 towns with capacity to co-compost the organic fraction of the waste stream with sludge from paper mills and waste water treatment plants. The Belchertown study analyzed the feasibility of a small-scale co-compost operation where organic wastes from the Belchertown State School could be co-composted with sludge from the waste water treatment plant.

Nantucket officials have recently negotiated a contract for the construction and operation of a Buehler-Miag MSW composting system. The system involves separating the compostable fraction of the MSW, shredding it in a drum mechanism, and setting the material in windrows which are aerated and mechanically turned for composting. Construction of the facility is scheduled to begin in 1990. Now, communities in Franklin, Hampshire, Hampden and Essex Counties have begun to explore the feasibility of regional MSW composting facilities.

MSW composting (and co-composting) is widely practiced in Europe, Asia and the Middle East, with hundreds of facilities in operation. MSW composting in the U.S. is growing, but not yet widely practiced, with eight facilities currently operating, ranging from 8,000 to 80,000 TPY, and over 40 others that are in the planning or construction phase. It should be noted that the waste stream in the United States is different from that in Europe, Asia, and the Middle East, and contains a higher proportion of inorganic materials such as glass, plastic, and metal.

The number of companies offering composting systems in the U.S. has increased to over 40. Companies offer a range of composting systems differing in the labor and capital intensity, the amount of residuals produced, and the amount and quality of compost produced. MSW composting experts agree:

- o communities should establish a household hazardous waste management system to remove those toxic fractions from the waste stream; and
- o adequate sampling and evaluation of the compost product is a must.

All MSW composting systems employ pre-processing, composting, and curing. The pre-processing stage generally consists of separating non-compostable and recyclable material from the organic portion of the waste, reducing the particle size of the organic material for improved composting and possibly mixing the waste with sludge. The process

involves initial removal of large non-compostable material (eg. white goods), removing recyclable material (eg. metal, glass, aluminum, plastic and corrugated) with picking lines or mechanical separators and further mechanical processing for particle size reduction, separation and mixing. The particle size reduction is achieved by shredding or grinding using vertical or horizontal shredders, hammermills and/or drums mixers/shredders. Following size reduction, many systems also employ equipment to separate the waste by size or weight, using trommell/rotary, vibrating or disc screens, air classifiers and magnetic separators to remove additional non-compostable and recyclable material. Also the waste may be separated into a light fraction of paper and plastics to create a refuse-derived-fuel (RDF) that can be burned more efficiently than mixed MSW, and a heavy compostable fraction. The compostable fraction is then mixed with sludge and/or water to provide for adequate moisture (50%-60%) prior to undergoing composting. The pre-processing stage usually accounts for the majority of the capital and operating cost for a facility.

Following the pre-processing stage, the organic material is composted. Composting occurs in a highly controlled environment to ensure required levels of oxygen, moisture and temperature. Temperatures must be high enough for at least several days to destroy pathogens and must meet EPA requirements for pathogen reduction. A variety of systems are used to compost the material. They include open windrows, bins, and enclosed digesters, drums, and reactors. The composting process itself usually takes 14 to 28 days, depending on the system, after which a curing process is required to fully stabilize the product.

The post-processing stage includes curing, material separation and storage of the compost product. Curing of the compost provides for further decomposition and stabilization. The amount of processing required at this stage depends on the type of pre-processing and composting utilized and the end-use of the product. Screeners, grinders and glass separators may be used to create a higher quality product. Different grades of compost product can be generated. The compost product may be distributed or marketed in bulk or bagged depending on the market. A wide variety of uses of compost product, such as for landfill cover, road bank or dune stabilization, landscaping, or as a potting material at nurseries have been found to be feasible.

Solid Waste Combustion

In the early 1980's, the state's goal was to process 50% of the Commonwealth's solid waste at combustion facilities. Towards this end, the state played an active role in the North East Solid Waste Committee (NESWC) project, which involved the construction of a 1,500 ton-per-day energy recovery facility in the Town of North Andover. Bureau of solid waste involvement included coordination of 22 participating towns, the purchase of a facility site, and the purchase of residue, emergency, and by-pass landfill space at the City of Peabody landfill. As private initiatives to construct solid waste combustion facilities increased, the Bureau's promotional role was no longer warranted. Instead, the Bureau's staff efforts were turned toward developing recycling and composting expertise and operations.

Waste-to-energy facilities utilize technologies such as mass-burn, refuse derived fuel (RDF), fluidized bed combustion, incineration, and pyrolysis (a thermal degradation process that works in the absence of oxygen) to reduce waste in volume and to recover energy. Three technologies--incineration, mass-burn, RDF--are employed by facilities located in Massachusetts. Incinerators have been operating within Massachusetts since the late 1800's while mass-burn and RDF facilities have been operating since 1975.

- Two facilities in Massachusetts are permitted to incinerate MSW. This process simply reduces waste by volume for efficient landfilling. The state's six mass burn facilities burn unprocessed, non-homogeneous garbage. In this technology the furnace is lined with a water wall, which is constructed of water-filled tubes to reduce furnace temperatures and facilitate recapturing energy. Water in the waterwall is transformed to steam by the heat of combustion, then sent through a turbine generator, where steam is converted to electricity.

Two of the Commonwealth's combustion facilities employ the Refuse Derived Fuel (RDF) system which involves separating certain components of the waste stream prior to incineration. Preparation of the fuel consists of separating ferrous metals and then shredding the remainder into fairly small, uniform pieces. The separated metal is recycled. Further refinement can be achieved depending on the range and complexity of the processing systems incorporated in the plant design. This

pre-screening of materials prior to shredding creates a more homogeneous fuel with a higher British Thermal Unit (BTU) rating. RDF generally burns at a higher temperature, depending upon the front-end processing, and can result in a cleaner ash for disposal thereby reducing the possibility of groundwater contamination at the ash-landfill.

Today, six of the state's waste-to-energy facilities (mass-burn and RDF) are operational and two are nearing the operational phase. One of the municipal incinerators is operating while the other is seeking ash-landfill capacity before it will be allowed to operate.

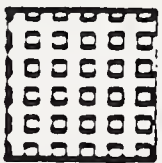
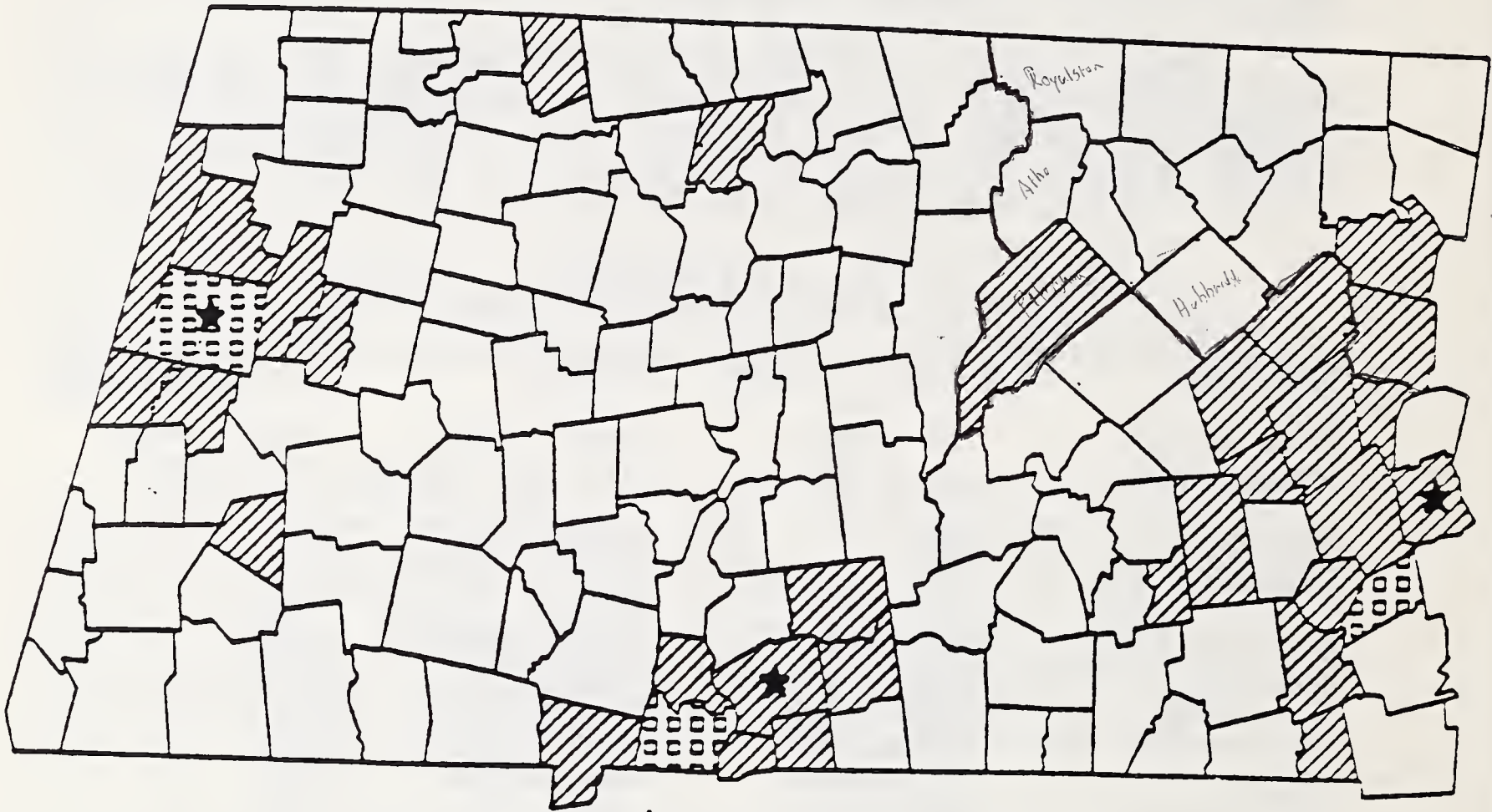
Figure 5-e
Solid Waste Combustion Facilities

<u>Location</u>	<u>Type of Process</u>	<u>Status</u>	<u>Facility Type</u>
Fall River	Mass-Burn	Operating	Incinerator
Framingham	Mass-Burn	Not Operating	Incinerator
Lawrence	RDF	Operating	WTE
Rochester	RDF	Test Phase	WTE
Haverhill	Mass-Burn	Under Constr.	WTE
Millbury	Mass-Burn	Operating	WTE
N.Andover	Mass-Burn	Operating	WTE
Pittsfield	Mass-Burn	Operating	WTE
Saugus	Mass-Burn	Operating	WTE
Springfld	Mass-Burn	Operating	WTE

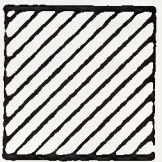
Combustion facility permits limit facilities to processing up to the amount of solid waste they are designed to burn per year of full operation. In 1987, Massachusetts waste-to-energy facilities combusted 1.6 million tons, or 27% of the volume of residential and commercial (municipal) solid waste generated in the state. The maximum on-line burn capacity permitted for 1988 was 1.97 million tons per year, or 31% of the state's solid waste stream by volume. In 1989, that percentage will rise to 48%, or 3.13 tons per year.

These permit levels are not expected to represent the tonnage burned at waste-to-energy facilities. Actual numbers depend on factors such as shut down periods caused by enforcement activities, regular maintenance, scheduled construction, or by a facility taking in less waste than its design maximum. These factors characterize on-line availability which is the percentage of tonnage combusted compared to the permitted level.

Massachusetts Municipalities Combustion



Municipalities Host to Combustion Facility



Participating Communities



Municipalities Host to Ash Landfill

Under Contract with Waste
Facilities, 1988

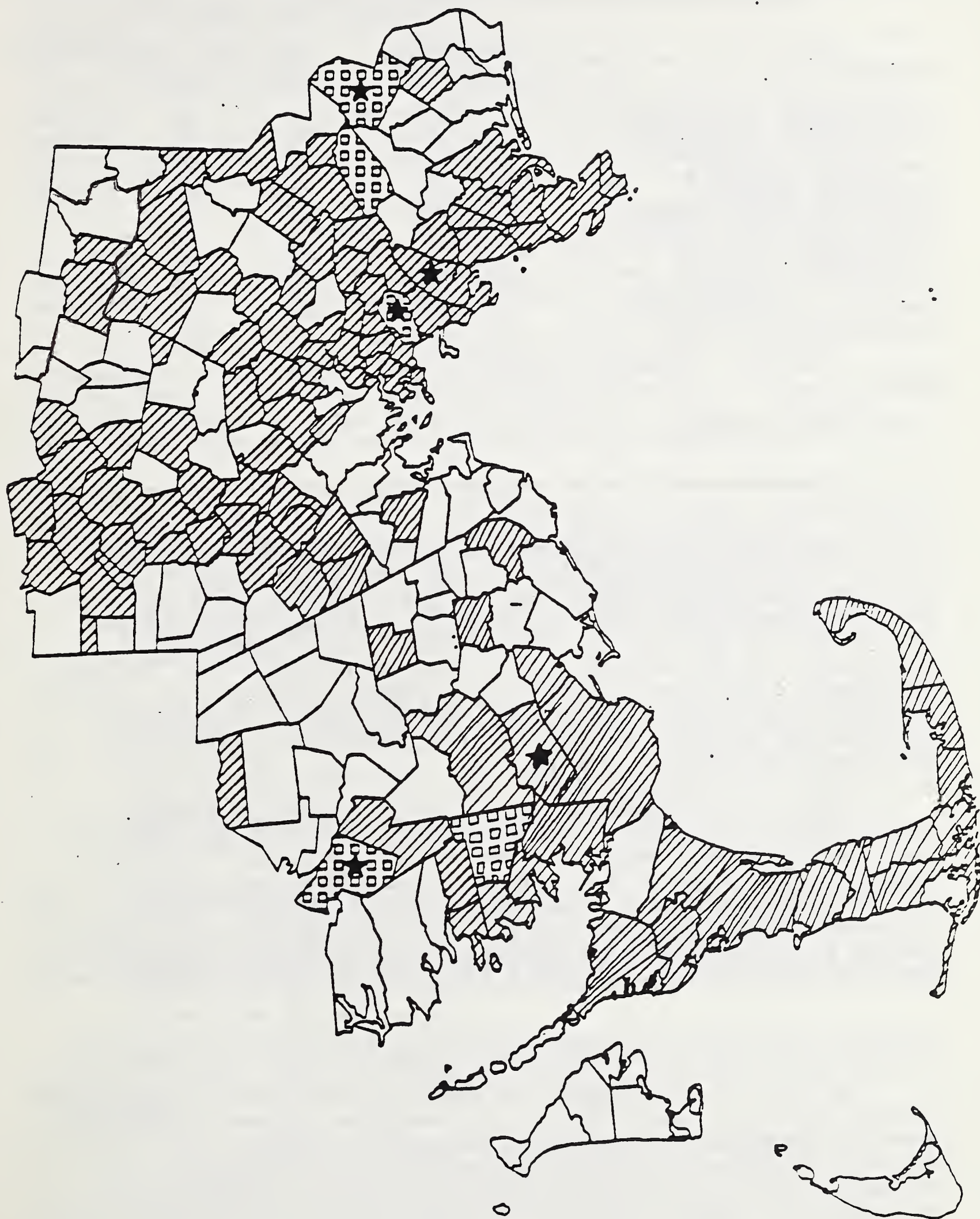


Figure 5-f
On-Line Availability of MSW Combustion Facilities

<u>FACILITY</u>	<u>TPY BURN Capacity</u>	<u>%ON-LINE AVAILABILITY</u>	
		<u>1988</u>	<u>2000*</u>
FALL RIVER (MUNICIPAL)	87,600	85	85
FRAMINGHAM (MUNICIPAL)	91,250	0	85
HAVERHILL (OGDEN)	602,250	0	90
LAWRENCE (OGDEN)	336,530	85	85
MILLBURY (WHEELABRATOR)	547,500	82	87
NORTH ANDOVER (NESWC)	547,500	90	90
PITTSFIELD (VICON)	87,600	90	90
ROCHESTER (SEMASS)	657,000	10	80
SAUGUS (WHEELABRATOR)	547,500	85	85
SPRINGFIELD (FLUOR)	131,400	45	90
TOTAL	3,636,130		

*projected numbers

The solid waste combustion process has two by-products: air emissions and residual ash. Air emissions include particulates, sulfur dioxides, nitrogen oxides, metals, and partially combusted organic chemicals. These emissions are controlled by monitoring and regulating the combustion conditions in the boiler, and by adding air pollution control equipment. Applicable federal air quality regulations include National Ambient Air Quality Standards (NAAQS), New Source Performance Standards (NSPS), and Prevention of Significant Air Quality Deterioration (PSD).

Air quality control devices are designed to remove particulates and gases. Electrostatic precipitators are the most commonly used method to remove particulates. In this process, particles in the emission gases are electrically charged and drawn to a plate carrying the opposite charge. The collected particles comprise the majority of fly ash. Fabric filter baghouses are also commonly used to control particulate. Wet and dry acid gas scrubbers can control gaseous contaminants.

Acid Gas Scrubbers and Other Environmental Control Techniques

Aside from the removal of certain components of the waste stream prior to incineration, the resource recovery industry uses two predominant emissions control techniques. The first is monitoring and controlling the combustion efficiency in the boiler so as to maximize the amount of organic material that is converted to carbon dioxide and water vapor in the incineration

process. The second is operation and maintenance of emissions control devices such as electrostatic precipitators, fabric filters, and acid gas scrubbers.

In the mid-1980's DEP first required new solid waste combustion facilities to be built with acid gas control devices. In 1987, recognizing the benefits of acid gas control devices, the Legislature required all facilities to operate with acid scrubbers or other such technology providing equal or greater protection to the public health and the environment. Ch. 584 requires that those facilities that were operating prior to January 1, 1977 operate with acid gas control devices by July 1, 1989. Facilities operating after January 1, 1977 will be required to install acid gas control devices at a time to be determined by the Department on a case by case basis.

Four of the Commonwealth's ten solid waste combustion facilities -- Millbury (Wheelabrator), Rochester (SEMASS), Springfield (Flour) and Haverhill (Ogden Martin) -- operate with acid gas control systems that satisfy DEP. Of the remaining facilities, three were operating before January 1, 1977.

- o Saugus (RESCO) will continue operations while it retrofits the facility one boiler at a time. Construction of the acid gas control device is slated to begin summer of 1989 and continue over an eighteen month period. House Bill 2081, recently passed by the Massachusetts Legislature, will allow for this by extending the compliance date for installation of acid gas control measures to 1990.

- o Fall River (Municipal Incinerator) has an ionizing wet scrubber, but the system has marginal efficiency and does not satisfy DEP requirements. Ch. 233 of the Acts of 1988 extends the compliance date for installation of acid gas control measures until 1991. The project is estimated to cost approximately \$28 million and require one year to complete.

- o Framingham (Municipal Incinerator) has a dry scrubber system. Currently the facility is shut down because it has no ash disposal site. Other problems which must be addressed before operation resumes include run-off from parking areas where incinerator ash has settled and excess noise from the facility.

The three facilities operating without acid gas control operating after 1977 are allowed a more generous timeframe for compliance.

- o North Andover (NESWC) was originally designed to accommodate an acid gas control system. Construction time and cost of the project will be lower than most other retrofits because of this planning. To date no acid gas

control installation schedule has been established for the facility.

- o Lawrence (Ogden Martin) is considering the installation of a lime injection system to control acid gases. Such systems typically achieve a 40% - 60% reduction of acid gases and may not meet DAQC standards for compliance with the provisions of Ch. 584. Major modifications to the facility will be necessary. No acid gas control installation schedule has been established for the facility.

- o Pittsfield (Vicon) will be off-line for approximately one month this summer for retrofitting. The time for retrofitting is short because the facility is a small (rated at 360 tons per day) and no major renovations to the facility will be necessary to install the acid gas control equipment.

Combustion Facility Ash Characterization

Two streams of ash result from the combustion of municipal solid waste; fly ash and bottom ash from the grate. Each component has varying amounts of contaminants, a different consistency, and other factors which could impact reuse and hazardous classification. The Department, based upon its authority under Chapter 111, section 150A, requires proper ash disposal. New ash landfill designs must meet the following minimum requirements: 1) landfill liners shall utilize composite liner technology consisting of, as a minimum, two feet of soil with a permeability of 1×10^{-7} cm/sec overlain by a sixty mil synthetic membrane, 2) facility shall provide for proper leachate collection, treatment (if required), and disposal, 3) facility shall provide for an approved groundwater monitoring program, and 4) facility shall be designed as an ash monofill. The Department requires all proposed waste-to-energy facilities to have 1) ash disposal monofill capacity (landfills designed solely for the disposal of ash) of 20 years for the plant's projected ash volume, 2) space available for bypass waste (refuse or noncombustible solid waste resulting from a plant's downtime), and 3) space for a minimum of six months bypass disposal based on the maximum waste volume reasonably anticipated due to a temporary shutdown.

Trace organic concentrations of dioxin in combustion facility ash provide cause for concern. Recent readings from incinerators operating in Massachusetts have shown the levels of total dioxins and furans to range from non-detectable to approximately 12 parts per billion (ppb). The level for the highly toxic 2378 dioxin isomer in a combined fly ash and bottom stream varies between non-detectable and .1 ppb. Preliminary indications are that dioxin levels can be controlled by modifying plant operating conditions such as lowering or raising

the boiler or kiln temperature, or by external thermal treatment. This treatment may also improve the reuse potential of the bottom ash residue.

The Division of Solid Waste Management estimates that the state's combustion facilities generated 461,156 tons of ash in 1988. With increased utility, they will likely produce 711,263 tons per year. (A weight reduction factor of 75% is assumed for mass-burn and 84% for RDF technologies.)

Figure 5-g
Projected Ash Production
(TPY)

<u>Facility:</u>	<u>1988</u>	<u>1992-2000 Annually</u>
Fall River (Inc.)	18,615	18,615
Framingham (Inc.)	0	19,391
Haverhill*(Ogden)	0	135,506
Lawrence*(Ogden)	45,768	45,768
Millbury*(Wheelabrator)	112,238	119,081
North Andover*(NESWC)	123,188	123,188
Pittsfield(VICON)	19,710	19,710
Rochester*(SEMASS)	10,512	84,096
Saugus*(Wheelabrator)	116,344	116,344
Springfield(Flour)	<u>14,783</u>	<u>29,565</u>
 TOTAL:	 461,156	 711,263

* Facilities with back-end ferrous metal separation presently recycle 1 to 10% of the total ash generated per year.

Ash Re-use

DEP has determined that ash from solid waste combustion facilities is a solid waste which has the potential to be reused or recycled. Presently, industry is researching potential uses for ash, including using it as an amendment to concrete products for construction applications, embankments, road paving material, and pre-cast blocks and as landfill cover. Before state regulators accept such product uses in the regulatory process, these products must undergo further field testing.

The Department welcomes alternative proposals for use of ash providing they are demonstrated to adequately protect public health, safety and the environment because reuse of ash conserves landfill space. But encapsulation problems need to be resolved. The scientific community must establish performance standards for compression strength, bulk density and resistance to leaching. Once this is decided, each product must meet established construction criteria and answer outstanding questions of solidification, stabilization and chemical fixation for highway use.

Presently, industrial research and development focused on promoting opportunities for reuse and recycling bottom ash. With most states increasing their regulatory demand for removal of HCL and SO₂, the technology for removal of potentially harmful substances from combustion gases improves yearly. The end result may be higher concentrations of heavy metals, dioxins, and other pollutants in fly ash, rendering it less useful in recycling applications.

The Future Role of Solid Waste Combustion in MA

In December, 1988, DEP announced its assessment of combustion facilities. This temporary delay in the issuance of DEP permits for new solid waste combustion facilities affects municipal solid waste combustion facilities. Between the date of the announcement and the issuance of the final draft of the Master Plan in December, 1989, DEP is analyzing the justification for increased burn capacity, and exploring policy planning, and regulatory improvements for the Commonwealth's integrated solid waste management system. The goal of this work is to ensure that the development of combustion facilities does not preclude coherent solid waste planning or act as a disincentive for the development of a diversified solid waste management system.

The following observations form the basis for this:

- o The state has achieved a permit level for combustion facilities which is presently equal to 31% of the MSW produced in the state. It has done so in partnership with local Boards of Health and communities by helping these entities make decisions about planning and siting these facilities. In 1989, the permit level will reach 48% of the solid waste stream in the state. If left unchecked, proponents may well construct combustion capacity which exceeds the tonnage of municipal solid waste generated in the Commonwealth.
- o Solid waste combustion as a primary means of disposal is a disincentive to the more benign solid waste management solutions, such as recycling and composting. Commonly, contracts between municipalities and combustion facilities include payment based on minimum tonnage supplied, a "put-or-pay" contract. Thus, if due to recycling, a municipality delivers less than its agreed-upon minimum to the waste-to-energy facility, the municipality will still be required to pay the contractually required amount.
- o The Commonwealth's use of solid waste combustion may be inefficient. It allows burning of components of the waste stream which may have greater dollar value

if recycled or composted, or may be more safely disposed in other ways.

In 1989 DEP is analyzing facts, figures, and policy options regarding solid waste combustion. Specifically, the agency is:

- o improving the accuracy of its data for MSW generation and disposal rates;
- o analyzing whether there is sufficient justification for increased burn capacity;
- o reviewing existing public financial subsidy programs available to the solid waste industry. Assessing whether they provide advantage to the solid waste combustion industry and if they can be restructured to better favor recycling and composting;
- o completing the process started with the new site assignment regulations, which is to restructure the DSWM's solid waste regulations to accomplish integrated solid waste management goals;
- o proposing revisions to the MEPA review process so that it, too, works to accomplish integrated waste management goal;
- o exploring additional policy, planning, and regulatory tools which can be created or improved upon or created to help ensure success in realizing the Commonwealth's integrated waste management goal; and
- o exploring the policy option of extending the prohibition on granting new operating permits for solid waste combustion facilities beyond the time of completion of the Master Plan.

Landfilling

In the past ten years, there have been considerable advances in landfill technology such as the development of synthetic liner systems and monitoring systems which can detect minute levels of chemical contaminants in groundwater and landfill leachate. These advances have indicted our past disposal practices by highlighting their potential to damage the environment and public health. As a result, standards for construction, operation, and environmental monitoring at landfills have been tightened. Even with these advances in engineering technology landfilling is not a preferred option for solid waste management. DEP's goal for the year 2000 is to eliminate direct disposal of solid waste at all landfills. This means that landfills will be used for disposal of by-pass and residue from processing facilities.

Examples of municipal solid waste landfills which pose threats to public health and the environment are spread across the Commonwealth. Of the approximately 700 active and inactive sanitary landfills in Massachusetts only 80 have liners, and approximately the same number have leachate collection systems. Sixty-four landfills have groundwater monitoring wells, 29 have surface water monitoring wells, and 9 have methane gas monitoring systems. The map on pages 104-105 shows which communities currently rely on unlined landfills.

Landfill leachate contains inorganic and organic compounds which are difficult and costly to remove from contaminated ground water. In an effort to control the migration of leachate from landfills into groundwater, landfills are being designed to include liners made of clay or other impermeable materials and leachate collection systems. In addition, environmental monitoring networks are being installed at new and existing landfills to detect the release of landfill-generated leachate.

Protecting Water Supplies

DEP's top policy priority is the protection of the Commonwealth's water resources. With 34% of Massachusetts' residents dependent upon public water supply wells, special attention has been given to the protection of these resources. Over 13 public water supply wells have been closed due to chemical contamination and many more wells are threatened.

Ill-managed landfills are identified as the cause of the contamination of several municipal water supply wells.

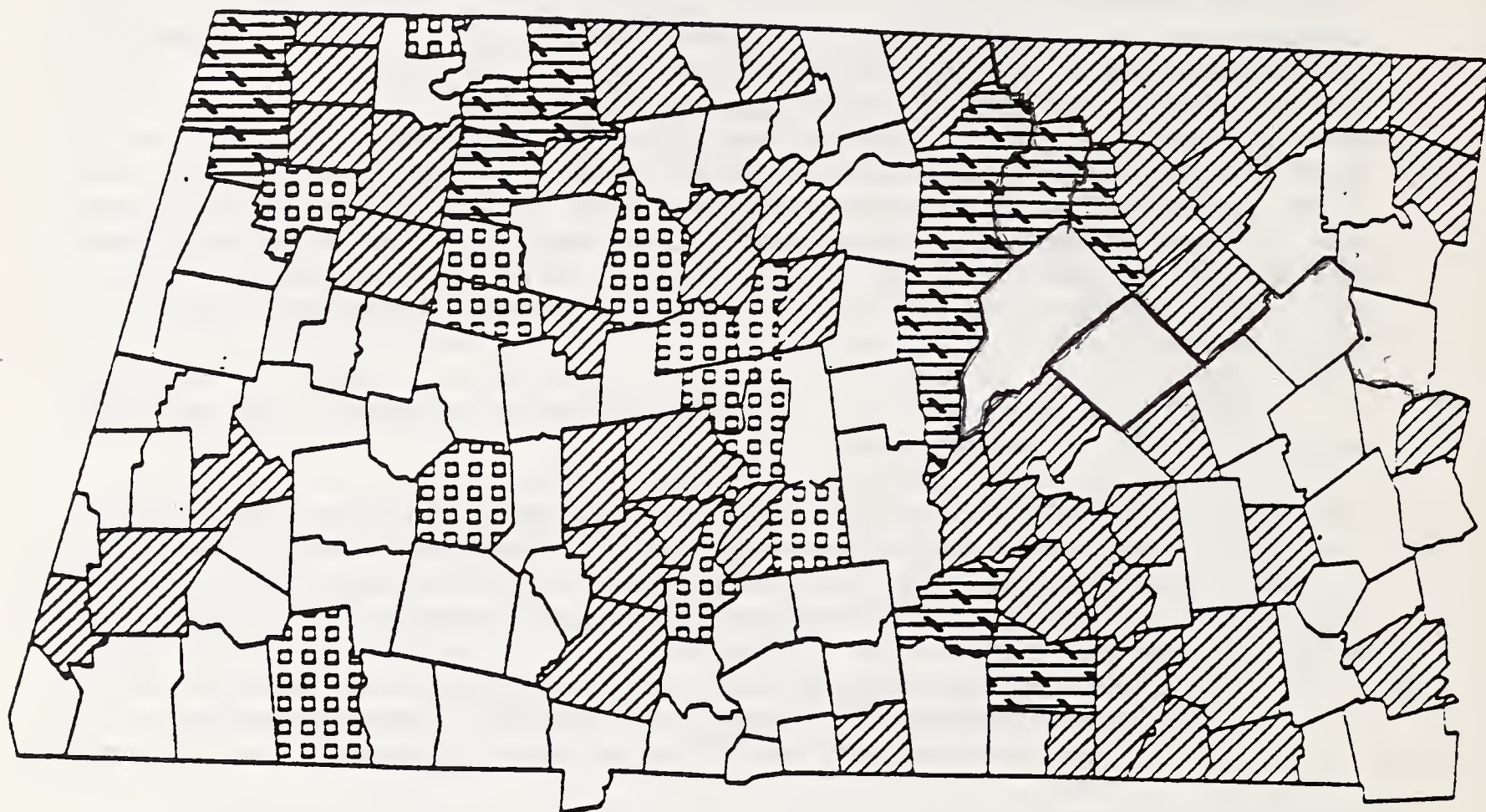
Recently, the DEP, in conjunction with the EPA and USGS, commissioned a study of the Cape Cod aquifer to determine what could be done to protect public supply wells from chemical contamination. The study, referred to as the Cape Cod Aquifer Management Project (CCAMP), resulted in a series of recommendations for implementation by the DEP and local government agencies. The primary recommendations for solid waste facilities called for restriction of the use of Zone IIs (the groundwater recharge area for a drinking water well) from the siting of solid waste facilities, establishment of standards for landfill monitoring, and prioritizing the assessment, phase out, and capping of landfills which threaten drinking water supplies.

DSWM, as part of the DEP's program to protect the ground waters of the commonwealth, will:

- o prohibit the siting of new landfills and restrict the siting of non-disposal facilities within Zone IIs via the Site Assignment Regulations (310 CMR 16.00) which were promulgated in September 1988;
- o establish a priority for assessing the potential environmental impacts of landfill leachate on groundwater through the Landfill Assessment Program; and
- o incorporate in the proposed General Solid Waste Facility Regulations (310 CMR 19.00) the phasing out of existing landfills located in Zone IIs, the establishment of standard landfill monitoring requirements, and the establishment of state-of-the-art landfill design and operation standards and requirements.

The goal of eliminating direct disposal of solid waste in landfills by 2000 and the threat of pollution from landfills are the two forces driving landfill management policy in the Commonwealth. Consequently, the vast majority of programs for landfill management are geared towards cleanup and closure of inferior landfills. These programs are administered by the Division of Solid Waste Management in conjunction with the newly formed Bureau of Waste Site Cleanup (WSC). Chapter 21E and Chapter 21H are administered in coordination to ensure application of hazardous waste clean up standards as warranted.

Massachusetts Municipalities Without



Municipalities Served by Regional
Municipal Landfills

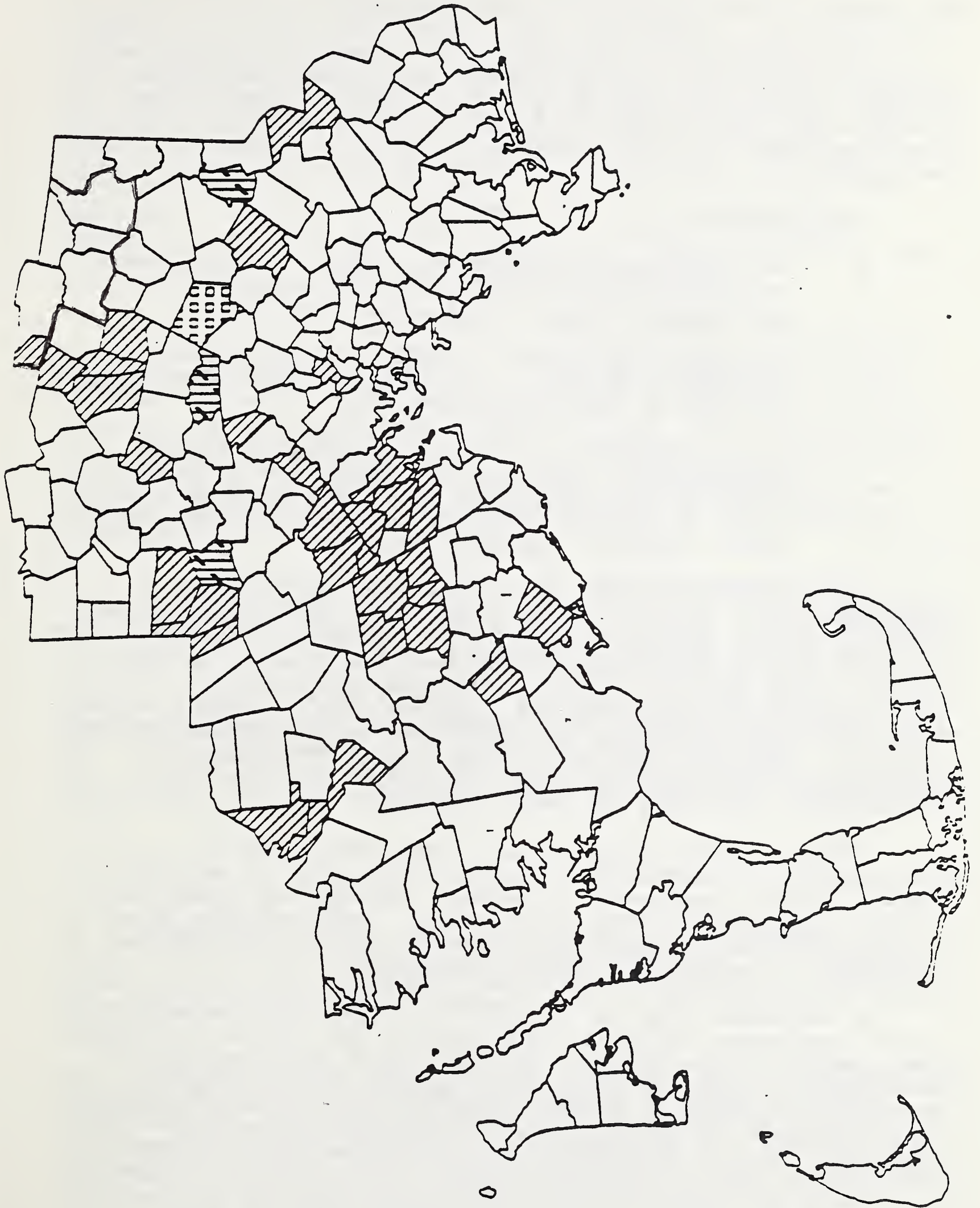


Municipalities Served by Regional
Commercial Landfills



Municipalities Served by Single
Municipal Landfills

Served by Landfills
Liners, 1988



The Landfill Assessment and Cleanup Program

A cornerstone of the Commonwealth's efforts to protect groundwater supplies is the Landfill Assessment and Cleanup Program. Under this program, DEP will conduct Initial Site Assessments (ISA) at all 700 landfills in the State to identify possible threats to groundwater and other environmental receptors.

The purpose is:

- o to determine the existence, extent, source, and characteristics of pollution suspected of originating from a solid waste facility;
- o to assess the extent to which such pollution presents a threat to the public health, safety, or welfare of the environment; and
- o to investigate the need to implement necessary containment, clean-up, or closure activities in order to eliminate, minimize, or prevent pollution from affecting an existing or potential drinking water supply or the environment.

In this program, DEP will conduct an Initial Site Assessment (ISA) at every known landfill in the Commonwealth. DEP will analyze data on proximity of the landfill to water supplies, wellhead recharge areas, Zone IIs, wetlands, and surface water bodies. It will also take into account hydrogeological characteristics, such as depth to ground water, depth to bedrock, and soil permeability in the vicinity of the landfill. DEP will draw the information from existing hydrogeologic studies, environmental impact reports, USGS studies, municipal and DEP data, and site visits.

If ISA results suggest that there are potential environmental problems, the landfill owner will be required to conduct a full assessment, or augment an existing study, to include a complete hydrogeologic study. This detailed study will describe and analyze the extent to which a landfill has or threatens to contaminate the environment.

A component that may be part of a full site assessment is a risk assessment estimate the potential for adverse effects on human health or the environment that result from exposures to specific pollutants or other toxic agents. Specifically, a risk assessment attempts to answer two questions: 1.) What adverse health effects are associated with exposure to specific chemicals? and 2.) How likely is an exposure event to occur? Such studies may be extremely complex and difficult to perform for a landfill site, however, the results may be valuable in determining the method and extent of site clean-up and containment which is necessary.

All publicly-owned landfill sites needing a full assessment will qualify under the Solid Waste Act for funding of a complete hydrogeologic study, risk assessment, and remedial action feasibility study. Ch. 584 authorizes DEP to expend \$100 million through a program of grants and loans to public bodies for the purposes of the program. Funds are available for up to 100% of the project costs, composed of a 90% grant and a 10% no-interest loan. In cases where there is an existing hydrogeologic study and/or remedial action study, DEP will review the work and, if warranted, make grants available to complete or expand these studies. DEP will soon adopt regulations for this funding program. Eligible projects, approved by DEP and which commenced on or after January 1, 1986, may receive grant awards for retroactive payment.

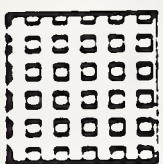
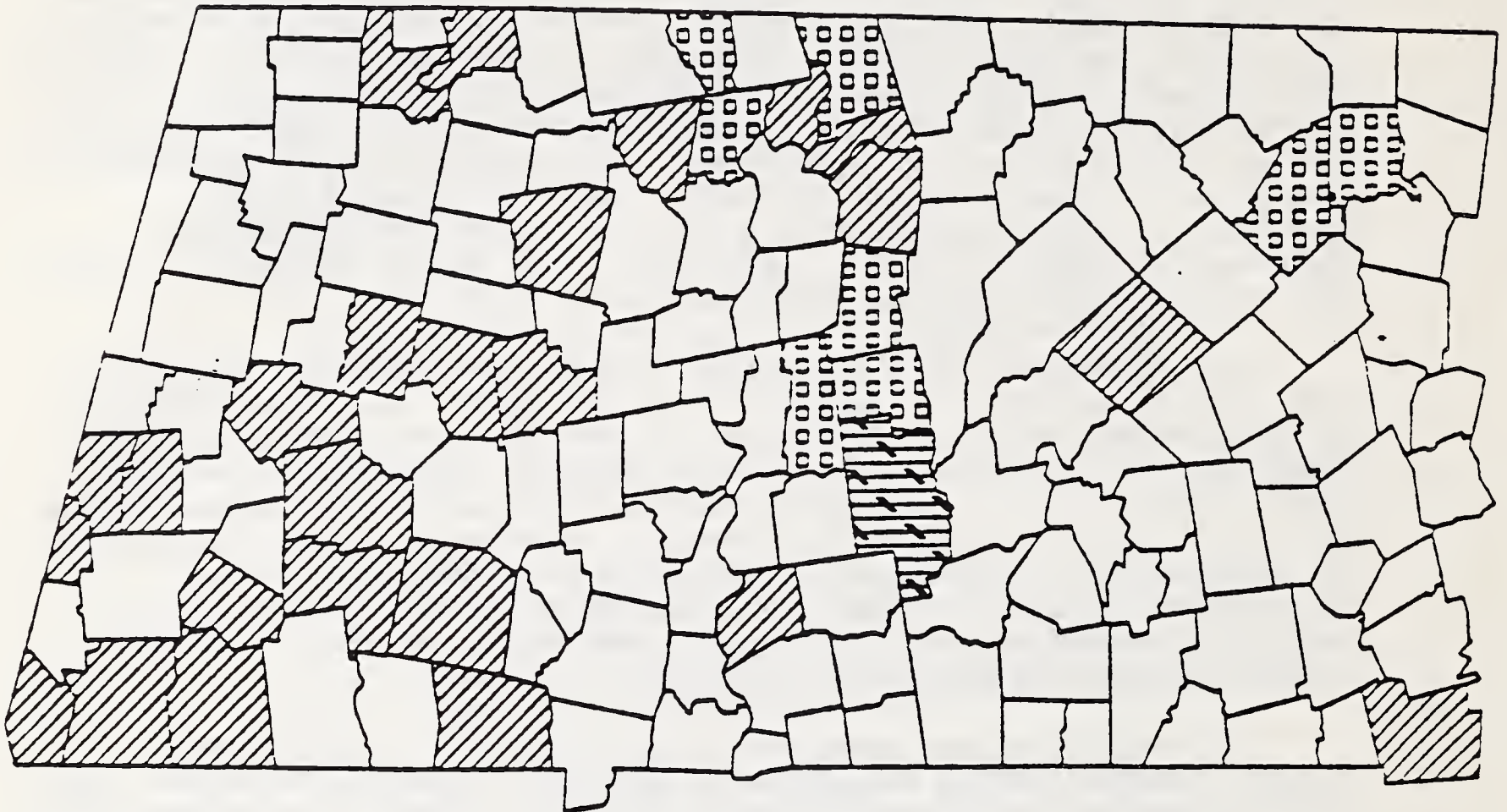
If the owner of a facility needing remediation fails to take action or make an application for grant and loan funds to do this work, DSWM can make use of its Solid Waste Superfund Program. In addition to the \$100 million Landfill Assessment fund, DEP is also authorized through Chapter 584 to spend up to \$12.5 million to perform discovery, assessment, and remediation of pollution, or threats of pollution, to drinking water supplies or the environment caused by solid waste facilities. Cost for remediation are the responsibility of the landfill owner or other responsible parties.

To expedite the assessment and clean-up program for landfill sites, DSWM developed a priority list of 38 sites that pose a risk of pollution to groundwater. Faced with a shortage of available Ch. 584 funds, DSWM staff reviewed the existing files on the top 38 sites and further ranked them using a broader criteria which included: environmental threat, compliance history and the community's willingness to work with DEP. The result was a list of the 14 highest priority sites. This smaller list provided DEP with a group of target communities for model projects and/or dispersal of limited grant funds.

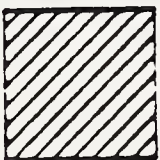
Landfill Closure Programs

Authorized by St. 1983, c. 723, s. 9H, as amended, this program has a bond authorization of \$10,000,000. It provides grants to municipalities for the purpose of planning, designing, and closing publicly-owned landfills in an environmentally-sound manner.

Each application must include a demonstration component to monitor and evaluate the effectiveness of closure designs and technologies. Examples of demonstration components include implementing post-closure monitoring programs for leachate and methane, developing models which describe and predict pollutant transport in groundwater, studying the effectiveness of new varieties of seed and vegetative landfill cover, and an



Municipalities Served by Regional
Municipal Landfills



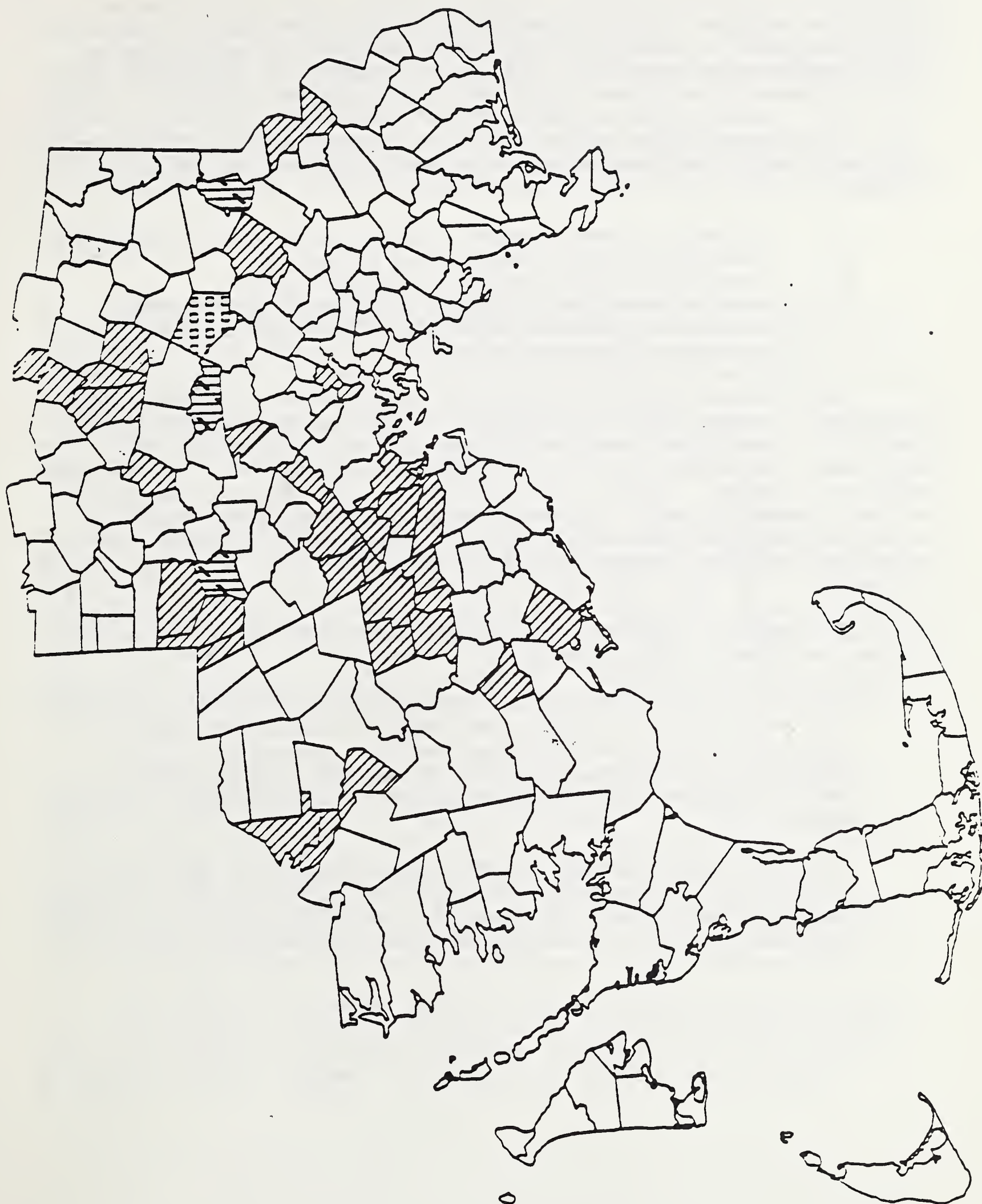
Municipalities Served by Regional
Commercial Landfills



Municipalities Served by Single
Municipal Landfills

Served by Llanurys
Liners, 1988

(109)



evaluation of a stormwater control system which utilizes a retention meadow. The demonstration component will be used by the Department to develop innovative designs or technologies that provide environmental protection standards which are equal to or greater than those required under current policy.

The Department's grant application period for this program yielded 83 applications which were rated on the following criteria:

- o threat to environment and drinking water supplies;
- o the applicant's compliance history;
- o long-term solid waste management plan;
- o existence of an adequate hydrogeological study;
- o technical merits and evaluation potential of the demonstration component.

In December, 1988 the priority list for the program was published. There are 24 landfills on the fundable portion of the list. Restricted access to capital funds allowed the Department to execute grant agreements with Amherst, Cambridge, Westford, Sharon, Auburn, and Dartmouth, the top 6 communities on the fundable list. The Department will obligate funds to these communities and others on the fundable portion of the priority list as funding becomes available.

In addition, Chapter 584 provides two forms of financial assistance for landfill closures.

- o Landfill Closures Linked to a Subsequent Regional Solution for Solid Waste Management: Public owners of such landfills would be eligible for assistance for up to 90% of costs, in the form of 20% grant and 80% no-interest loan. Chapter 584 authorizes up to \$40 million for this purpose.
- o Landfill Closures Not Linked to a Subsequent Regional Solution of Solid Waste Management: Public owners of such landfills would be eligible for assistance for up to 90% of costs in the form of 100% interest-bearing loans. Chapter 584 authorizes \$10 million for this category.

Chapter 6. DIFFICULT-to-DISPOSE-of WASTES

Difficult-to-dispose-of wastes are those which require special handling or disposal facilities because of their potential threat to public health and the environment. Because the processing and disposal of difficult-to-dispose wastes pose such a serious challenge to the Commonwealth, an understanding of these materials and disposal practices is essential.

Asbestos:

Asbestos is a natural mineral that separates into very fine fibers. The fibers are heat resistant and extremely durable. These qualities have made asbestos very useful in construction and industry. It has been clearly established that asbestos fibers are a hazard to human health when inhaled. Numerous studies of asbestos exposure link the fiber to three sometimes fatal diseases: lung cancer, mesothelioma (a cancer of the lining of the lung or abdominal cavity), and asbestosis.

The potential for an asbestos-containing product to release fibers which are harmful to human health depends on several factors including its state of repair and the product's degree of friability, the potential for the product to crumble with hand pressure and emit fibers into the air. The fibrous or fluffy, spray-applied asbestos materials found in many buildings for fireproofing or insulating are considered friable. Flexible vinyl and asphaltic roofing shingles or siding products are generally considered to be non-friable unless they are subject to sanding, drilling, or cutting.

From a public health standpoint, non-friable asbestos which has been properly wetted, bagged, and containerized is suitable for disposal in a sanitary landfill. The mineral fibers resist degradation and are inert and insoluble in water. As such, they do not represent a threat to ground-water supplies. Furthermore, in the event that the asbestos containers in the landfill fail at some future date, asbestos fibers will lodge themselves in the soil and are not likely to migrate.

Any brittle or hard asbestos-containing building material such as shingles, siding, and asbestos cement products which have the potential to emit asbestos fibers to the air must be properly wetted, bagged, and labelled during removal and disposal.

The Department is revising the ash disposal section of the General Solid Waste Facility Regulations giving the Department greater authority to determine where the special waste is disposed. Under the proposed new system, a disposal facility proponent must apply to the Department for a permit to dispose of asbestos. If the board of health disagrees with the determination of the Department, the burden of proof will be placed on the board to prove to the Department that the proposed disposal poses a public health threat. This new system promotes the development of adequately managed asbestos disposal capacity in the Commonwealth.

If handled at an existing transfer station, asbestos-containing waste must be managed independently from other solid wastes at that facility. Storage of asbestos-containing waste material must comply with 310 CMR 18.00, Installation, Operation, and Maintenance of Solid Waste Transfer Stations and with the Department's Guidelines for Storage, Consolidation, and Transfer of Asbestos Waste issued in February of 1988.

According to Department regulations and policy, advance notice must be given to the disposal facility operator when an asbestos waste shipment is ready for disposal. If the asbestos has been properly wetted and containerized, it may be placed in a trench or at the active face of a landfill for disposal. The asbestos-containing materials must be immediately covered to prevent any possible emission of airborne asbestos fibers.

Under state regulations asbestos is classified as a 'special waste'; local boards of health have the right to prohibit disposal of the waste at landfills in their community. As a result of the apprehension of many boards of health regarding asbestos disposal, in-state disposal capacity is very scarce. Generators of asbestos-containing waste have few disposal options available to them. It has been estimated that as much as eighty percent of the asbestos generated in the state is transported out of state for disposal, approximately fifteen percent goes to two commercial landfills in Chicopee, and the remainder is handled by municipal landfills. Typically, local landfills only accept asbestos-containing waste generated within the community. Furthermore, the extremely high cost of transport and disposal of asbestos has prompted illegal disposal including its deposit in small quantities as if a municipal solid waste.

Construction and Demolition (C & D) Debris:

C & D debris is discarded building materials and rubble from the construction, renovation, repair, or demolition of buildings or other structures. C & D debris varies greatly depending on the type of building, but typically includes wood, steel, concrete, masonry, plaster, aluminum, copper, asphalt, and asbestos.

The vast majority of all C & D debris is generated in the major metropolitan areas during the development of large projects. Because of these projects, the disposal capacity must accommodate a peak demand of up to 1,000 tons per day.

Currently, the majority of C & D debris is disposed at commercial landfills in Massachusetts and neighboring states. It is estimated that approximately 60% - 80% is deposited in state while the remaining portion is shipped out of state. Typically, the debris is deposited into dumpsters at the job-site and taken by a hauler either directly to a disposal facility or to a transfer station for consolidation before transportation to a disposal facility. In some cases large amounts of rubble, concrete and brick have been used to fill up quarries across the Commonwealth.

There are 7 landfills which accept significant quantities of C & D debris. There are also "dump-and-pick" operations where is dumped on the tipping floor and sorted into recyclable and non-recyclable material. All of these facilities are listed in Appendix 1, "Recyclable Material Markets and Waste Disposal Sites".

C & D debris has enormous potential to be recycled. The efficiency of the recycling operations are typically dependent upon the ability to separate the recyclable portion of the waste stream at the construction or demolition site. There are technologies that can accept unsorted C & D debris. There have been preliminary discussions with companies that would like to develop such facilities in Massachusetts, however, as yet there are none operating in the state.

Separating materials on the site of renovations or demolition projects has increased dramatically as the price of disposal has climbed. Separated materials can be accepted directly by processing facilities. These processing technologies have significant potential to reduce the amount of C & D debris that must be landfilled. Table 5 - i lists the major components of C & D debris and the preferred management options for each.

Table 5 - i
Preferred Management Options for C & D Debris

<u>Component</u>	<u>Preferred Management Option</u>
Wood	Chip for composting, landscaping or incineration.
Concrete	Grind and separate steel rebar, sell rebar as scrap steel, and use concrete as aggregate.
Rubble	Grind and use as grading material or aggregate.
Steel	Separate and sell as scrap steel.

Several companies are currently interested in developing C & D debris processing facilities in Massachusetts. These include:

- o a pyrolysis facility that would accept source separated wood waste and produce electricity;
- o various types of wood-waste and rubble crushing and processing facilities; and
- o wood-waste combustion facilities.

The Department encourages C & D debris recycling. Suitable uses for processed concrete and other clean fill will be identified. For wood-waste that is not suitable for recycling or processing DEP promotes development of environmentally-sound combustion capacity. While the need for C & D debris landfill capacity will be greatly diminished through reuse, recycling, and combustion, landfilling C & D debris cannot be eliminated all together.

There are a number of regulatory controls regarding C & D debris being considered by the Department. To stem the tide of illegal dumping of C & D debris, the Department is developing a model tracking and manifest system involving 13 communities. The Department will work with MEPA through the Environmental Impact Report generation process to require proponents of major projects to identify where C & D debris will be disposed of or handled, and, where possible, to require that C & D debris recycling take place. The state Department of Public Works is currently studying the ability of recycled C & D debris to meet state construction specifications. If recycled C & D debris meets these standards, the Purchasing Agent's Division, in order

to strengthen the market for these materials, will consider them for inclusion in Executive Order #279, the state's preferential purchase program for recycled materials.

Household Hazardous Waste:

Household Hazardous Waste (HHW) is hazardous waste which is generated in the normal course of household activities in single or multiple residences, excluding hotels or motels. Common household substances, such as drain cleaners, disinfectants, pool chemicals, pesticides, hobby supplies, used motor oil, and laundry bleach contain toxic chemicals and become household hazardous waste when they are discarded. Generally the amount of HHW in the municipal solid waste stream is small. It has been estimated that the average household generates 21 lbs. of hazardous waste annually. In Massachusetts, this accounts for about 0.1% by weight of the total solid waste generation or 6,000 tons of hazardous waste discarded each year. In addition to the annual generation many households may store significant quantities of HHW because there is a shortage of adequate disposal options.

Currently the vast majority of all HHW is disposed at solid waste landfills or combustion facilities or dumped down the drain. Unfortunately, these management methods may pose serious threats to public health and the environment. When HHW is co-mingled with solid waste, it contributes to the toxicity of leachate formed in landfills and increases the toxicity of the ash and air emissions from incinerators.

The primary objective of the state's HHW management program is to limit exposure to homeowners and ensure that discarded waste products are managed in a manner that is protective of the environment. The state program relies on an aggressive public education campaign to inform consumers of alternative products and to inform communities of appropriate means for collection and disposal of HHW.

Education is a critical component of any HHW management program because the preferred management option--source reduction--requires a change in consumer purchasing habits. In fact, there is a variety of non-hazardous products on the market which can be substituted for some of the hazardous products collected at HHW collection events.

Since 1984 the Department of Environmental Management (DEM) has issued grants to coalitions that have developed public education materials. DEP is incorporating some of these materials into a model school curriculum it is developing on solid waste management. In addition to the state-sponsored public education efforts, there have been several independent organizations that have begun outreach and educational programs on HHW management.

The state has also found that one-day collection events provide a beneficial source of education as well as a disposal option. Since 1982, when the first one-day (HHW) collection event was held in Lexington, there have been over 300 such events held in Massachusetts. Through these collection events, approximately 1000 tons of waste has been collected and sent to licensed facilities.

In planning for a one-day event for the collection of household hazardous waste the sponsor must address several issues including:

- o selecting a suitable site;
- o appointing a qualified emergency coordinator;
- o developing and implementing a public education and out reach program to the community which will be served by the collection event;
- o developing an emergency plan to be implemented in the case of an accident;
- o hiring an appropriately licensed transporter; and
- o raising sufficient monies to pay for the transporter and the public education and outreach program.

With the one-day collection events, the home owner brings the waste to the collection site where it is accepted by a licensed hazardous waste hauler, who packs the waste into shipping containers and removes all the collected materials from the site the same day. 310 CMR 30.391 governs one-day municipal or regional collection events. These regulations provide guidance relating to the selection of the site and the development of an emergency preparation plan, and the regulations establish that the transporter accepting the waste will be considered the generator of that waste for the purposes of the Hazardous Waste Regulations (310 CMR 30.000).

A municipality, group of municipalities, or any other person may sponsor a one-day event for the collection of household hazardous waste provided they comply with Department regulations. While the one day collection events have been successful at increasing the public awareness of the potential problems associated with HHW, they are not sufficient to ensure that the majority of HHW will be properly managed. Given that the average participation rate in a one day collection event is less than 2%, it would take a almost fifty collection events per community to clean out the HHW people have stored in their homes.

A permanent collection station, accumulating waste over a period of time, greatly reduces the cost of disposal when compared to the one day collection events. Because all waste

collected at a one-day event must be transported offsite the same day, the sponsor pays full price for the disposal of 55 gallon containers that contains only a limited amount of HHW. By accumulating the waste over a period of time with multiple collections the containers can be fully packed and the money allocated for disposal more efficiently spent.

Well-managed permanent collection station enjoy several advantages over the one-day collection events. The advantages include greater participation rates, more sustained and better education regarding the management of and substitutes for toxic household products, and potentially long-term cost savings. Expanding the current one-day collection events to a regularly available program, such as permanent collection stations, entails much planning and effort.

The Department has permitted a collection station for household hazardous waste to be established on Martha's Vineyard as a pilot project. In the absence of regulations the Department entered into a consent decree with the Martha's Vineyard Refuse Disposal and Resource Recovery District which specifies the management plan for the collection station. The Department has been closely monitoring the pilot project and is using the lessons learned from this project in the development of regulations that would allow other similar centers to be established.

Although most HHW must be disposed at a hazardous waste disposal facility once it has been collected, some HHW, such as lead acid batteries and paint, can be recycled if an appropriate system of collection and distribution are established. Currently, many states recycle lead acid batteries. Some states have developed paint collection and recycling programs where partially used cans of paint from the homeowners are collected and combined for future resale. The resulting recycled paint product is of lower quality but is adequate for many industrial uses.

Infectious Waste:

Infectious waste management and regulation has lately been making headlines. Due to inadequate regulations, some infectious waste is treated as conventional MSW, while some conventional MSW is treated as infectious waste, thereby using valuable special waste disposal capacity. To solve this problem DEP is working with the Department of Public Health (DPH) to develop new regulations for the comprehensive management of infectious waste at the site of generation where DPH has responsibility for regulation. The new regulations will require all generators of infectious waste to handle and package the

waste in a manner to protect public health. DEP has also developed a protocol for responding to spills and improper disposal of infectious waste and is working with the Legislature to allow the Department to comprehensively regulate its transport and disposal.

Sludge:

A 1986 survey estimated that 300,000 tons of sludge is generated in Massachusetts every year. Currently, that material is disposed in landfills, incinerated, land applied, dumped in the ocean, or stored at publicly owned treatment works (POTWs), more commonly referred to as wastewater treatment plants (WWTPs). However, such disposal options are rapidly becoming obsolete. Stricter standards at landfills will force many of those accepting sludge to close within the next three to five years, and local boards of health are also prohibiting disposal of sludge in many landfills today. Incineration of sludge is costly and time-consuming, because of the need to dry sludge before burning it, and the need to dispose of the ash afterwards. And, ocean disposal is now prohibited. As conventional disposal options have closed, DEP has initiated short- and long-term remedies for sludge management which call for maximal reuse of sludge.

The first sewer systems were relatively crude: they collected waste from both residential and commercial/industrial sources and then discharged sewage directly into waterways and oceans. By the late 1960's, Boston Harbor, the Farmington, Charles, and Connecticut Rivers, and many other waterways were severely contaminated by sewage and other industrial discharges. Waste water treatment plants were established in response to this problem.

Sludge is the mud-like residue left over from treatment of sewage and wastewater. Generally, there are two recognized types of sludges: those originating from sewage and those originating from industrial process discharges. Most sewage sludge is generated in WWTPs that receive residential, commercial and industrial discharges. Because there are different types of discharge, sewage sludge may contain a variety of contaminants: human sewage contributes pathogens; industrial waste water may contribute volatile organics such as solvents, and heavy metals, such as zinc or lead. For these reasons, sludge needs special handling and is classified by DEP as a special waste. This means that sewage sludge may not be disposed at solid waste facilities without approval of both the local board and the Department. DEP may require the waste to be treated before disposal.

In Massachusetts, industrial process sludge is often divided into two categories; paper mill sludge, and a combination of all other types of industrial process sludges. Paper mill sludge contains wood pulp and chemicals. This sludge generally has a low nutrient value and, therefore, has minimal value as a nutrient source in reuse options. If the resulting waste water contains any toxic or hazardous waste material, it is not reusable.

When sludge leaves the POTW it contains many contaminants. The most common management practice for sludge is landfill disposal. Table 5 - j presents data on the reuse and disposal trends of sludge. The data is based on the results of a 1986 survey of POTWs conducted by DEP.

Table 5 - j
Sludge Disposal and Reuse Trends

<u>Disposal Method</u>	<u># POTW's</u>	<u>TPY</u>
Landfill	79	161,557
Incineration	6	26,154
Ocean Disposal	2	18,500
To another POTW	10	2,848
Stockpiling	5	59
Not operating	5	--
Sub-Total:	107	210,118

<u>Reuse Method</u>	<u># POTW's</u>	<u>TPY</u>
Land application	7	3,668
Composting Facilities	4	--
Sub-Total:	11	3,668+

DEP projects that nearly 170,000 tons of sludge (approximately 75%) will be displaced from the disposal sites listed above during the next three years because of landfill closures and BOH prohibition. As a short-term solution to the capacity crunch, DEP promotes stabilizing the sludge, through either chemical or non-chemical processes, for use as daily cover at landfills. This type of process has been successful and is a short-term solution to Massachusetts needs.

DEP's goal is to establish sludge composting and reuse on a large scale in Massachusetts by 2000. In order to accomplish this, DEP will draft new sludge reuse regulations. These

regulations will facilitate reuse of sludge by setting standards for reuse that take into account the specific soil and other environmental factors. Some reuse options are listed in the following table.

Table 5 - k
Sludge Reuse Options

Horticultural/landscaping:

Compost Material
Soil Amendment
Mulch
Potting Medium
Top Dressing
Roadside cover

Engineering/Construction:

Brick/Cement Manufacture
Daily/Intermediate Cover and Grading Material for
Landfills

Agricultural:

Land Spreading -- food chain crops, grazing, and
non-food crops

Street Sweepings:

Street sweepings, classified as solid waste, are commonly disposed in landfills. Alternatively, it is used as daily landfill cover. If a municipality is interested in this course of action, it should contact the regional DEP office to determine if the sweepings are suitable for this use. In no case should street sweepings be mixed with catch basin residues. DEP requires catch basin residue to undergo the E.P. toxicity test and be tested for sulfides before choosing an appropriate disposal or reuse option.

Tires:

Approximately 6,000,000 tires are thrown away each year in Massachusetts. While the traditional tire disposal practices, landfilling and incineration, are becoming obsolete, annual generation has increased and no new dedicated capacity for tires has been developed. The result is an increase in illegal tire stockpiles throughout the Commonwealth. It has been estimated that there are as many as 30,000,000 tires in illegal piles in the Commonwealth. Beyond being unsightly and an inefficient use of land, piles present two serious public health and environmental threats: difficult-to-extinguish fires and the increased risk of certain diseases due to the unique breeding

environment that tires present for disease-carrying mosquitoes.

MSW landfilling or burning operations are not well suited to the management of tires. Tires, because of their structure, migrate to the surface when disposed in landfills. They present handling problems for solid waste incinerators and may cause those facilities to violate air quality emissions limitations due to the high levels of sulfur and metals in the tires.

The Department's goal is to eliminate all illegal tire stockpiles by the year 2000 and to build capacity for the safe handling of the annual generation of waste tires. It is estimated that this will require capacity to process, burn, or recycle approximately 9,000,000 tires per year by 1992.

Over the past several years, the Department has researched available technologies for processing and/or disposing of discarded tires. The Department's emphasis when looking for new capacity has been material recovery first, energy recovery second and landfilling as a last option. Because tires have significant potential for material and energy recovery, the Department has not aggressively explored landfilling as an option for the development of new capacity.

Currently, there is only one tire recycling operation in Massachusetts and few of the tire stockpiles are operated with necessary approvals and permits. A company in New Bedford uses car and truck tires to manufacture findings and riggings for the fishing industry. The company also has a shredding operation that can process up to approximately 3000 tires per day, and has a permitted tire pile. Seven companies offer tire shredding service to municipalities and companies in Massachusetts. These companies charge a fee based on the number of tires that are shredded. Once shredded, tires may be sold as a fuel to facilities located in Maine and Pennsylvania or disposed in a landfill. Only a limited amount of shredded tires are sold as an alternative energy source.

The Department issued the "Policy on Tire Disposal and Stockpiling" in June, 1987. Discarded tire stockpiles are considered disposal sites subject to M.G.L. C. 111, s 150A and classified as a solid waste management facility, unless the Department determines that:

- o the tires are being recycled in a lawful manner;
- o at least seventy-five percent (75%) of the tires are recycled or reused during each calendar year; and
- o the tires recycled or reused are lawfully and properly handled.

The Tire Policy also establishes guidelines for the development of fire lanes through the stockpiles to ensure that

fire fighting equipment may reach all portions of the pile. A preliminary review of stockpiles revealed that while some have taken fire prevention measures, very few of the stockpiles are being operated in accordance with the Tire Stockpile Policy, as it pertains to the requirements of moving 75% of the tires during the calendar year or getting a site assignment and permit.

DEP has made considerable efforts to attract companies providing alternative tire processing technologies to Massachusetts. In recent years, the Department worked aggressively to attract Rubber Research Elastomerics (RRE), Inc. of Minneapolis, MN to Massachusetts. RRE manufactures and markets a series of recycled rubber compounds made from discarded tires under the trademark 'Tirecycle'. The state offered assistance to RRE in siting and financing a tire recycling facility in Massachusetts. To date, the deal has not come to fruition because RRE is not yet ready to expand its operation from Babbitt, Minnesota where it is now based.

In addition to continuing to monitor the progress of RRE's ability to market their Tirecycle products, the Department is evaluating the suitability of various tire-additives to asphalt. There are on-going studies of various tire-asphalt technologies in New York and Washington State. The Department is monitoring the results of these and other studies and will work with the DPW in determining whether to recommend that the Purchasing Agent consider Tire-Asphalt be considered a recovered material. Pursuant to Executive Order 279, products that are made with recovered materials may be given price preferences of up to 10%.

While RRE's expansion to the Commonwealth has been delayed, several other companies have continued expansion plans for the New England area. Two companies that have progressed the furthest are The Oxford Energy Company and Waste Recovery, Inc. (WRI). The combination of the Oxford Energy and WRI facilities would draw about 6,000,000 tires per year from Massachusetts.

The Oxford Energy Company, is in the final permitting process for a facility in Sterling, Connecticut. The Oxford Energy Company is awaiting final decision on its permit applications and has already received all other necessary permits or approvals. The facility is expected to be fully operational in fall, 1990. It will process approximately 10 million tires a year, approximately the annual generation of tires in Connecticut, Massachusetts, and Rhode Island combined.

WRI has indicated that they want to site a facility in either Massachusetts or New Hampshire. The company currently has a facility operating in Houston, Texas and is proposing

additional facilities in Florida and New Jersey. The proposed WRI facility for New England would process approximately 4 million tires per year.

White Goods and Automobile Recycling:

Washing machines, dryers, refrigerators, microwave ovens, and fluorescent lighting fixtures, commonly known as "white goods", and junked automobiles have been grouped together in this section because they are often processed at the same facilities. While automobiles and white goods are valued for their recyclable metal, there are several environmental concerns and DEP policies which are common to both.

Appliance shredder operations recycle metal by shredding junked appliances and separating recyclable metal from non-recyclable materials. White goods, particularly those that were manufactured prior to 1980, may contain electrical capacitors or lighting ballasts which contain polychlorinated biphenyl (PCB), a known carcinogen and a hazardous waste subject to regulation by Massachusetts law. When white goods are processed by shredding, baling or crushing, the capacitors and lighting ballasts can be broken apart, and the resulting waste product which includes nonmetallic, non-recyclable materials will likely contain PCBs in concentrations greater than 50 parts per million, rendering the entire waste product a hazardous waste. If the PCB-laden components in appliances are removed prior to processing and disposal, it is likely the waste product from these operations can be disposed of as solid waste in certain Department authorized lined landfills which are equipped with leachate collection systems.

Under the guidelines issued by the Department, municipalities and businesses which collect white goods for disposal have two options:

- o they may ship the fully intact white goods to a processing facility which will remove the capacitors and lighting ballasts and arrange for their proper disposal as hazardous waste; or
- o they may remove all capacitors and lighting ballasts prior to shipment of the white goods to the processing facility and assume the responsibility to dispose of the fixtures as hazardous waste.

Because of the rising costs associated with disposing of white goods and apprehension about handling hazardous wastes, some municipalities have closed their landfill or transfer station to white goods. Those communities have advised residents to take their own appliances to scrap metal dealers. In some communities this has prompted an increase in illegal dumping of white goods. Communities are encouraged to accept

white goods at landfills and transfer stations and to charge a drop-off fee, if necessary. For a listing of white goods and scrap metal processing companies refer to Appendix 1.

Chloroflourocarbons (CFCs) are widely used in the United States as refrigerants in automotive, commercial and home air conditioning systems, and retail and home refrigerators. Typically, these refrigerants are vented to the atmosphere when a unit is serviced, repaired, or crushed at time of disposal. The release of CFCs into the atmosphere is closely linked to the depletion of stratospheric ozone and the global greenhouse effect.

An average automobile carries a 2 1/2 pound CFC charge while an average sized domestic refrigerator carries a 1/2 pound charge. Data from an EPA study performed in 1987 indicates that 7,426 metric tons of CFCs were emitted to the atmosphere in 1985 from disposal of refrigeration and air conditioning units throughout the country.

There are public policy initiatives at the national and international level regarding CFC management, however, Massachusetts currently has no laws on the matter. EPA is requiring U.S. producers of CFC to cut their production back to 1986 levels to fulfill the Montreal Protocol, an international agreement signed and ratified by the United States and other countries in 1988. The agreement calls for scheduled cuts in production CFC production so that by 1998 worldwide production of these gases will be 50% of the 1986 levels. Evidence that ozone depletion is worse than previously thought may prompt the signatory countries to increase the level of cuts and accelerate their implementation.

Automobile shredders in Massachusetts engage in recycling operations by shredding junked automobiles and producing recyclable scrap metal. Automobile shredder residue (ASR), sometimes referred to as "auto fluff" because of its low density and billowy appearance, is a by-product of this operation. In mid-1988, automobile shredders voluntarily closed down their operations because it was found that ASR contained high levels of waste oil and other hazardous constituents. After the closing of these facilities, stockpiles of abandoned and junked automobiles quickly grew, posing nuisance conditions and an imminent threat to public health, safety and welfare and to the environment.

The Department has allowed certain auto shredding companies to resume operations for a limited time period, provided the ASR from the facilities meets certain standards. During this interim period, the shredder industry and the Department will study and evaluate long-term solutions to the

production and disposal of ASR.

In cases where ASR is proven not to be a hazardous waste may be disposed in Department approved landfills with liners and leachate collection systems. ASR which exceeds the limits for metals, PCB, or total petroleum hydrocarbon must be disposed at a certified hazardous waste processing or disposal facility.

Prior to processing an automobile, the shredder facility is required to remove any items, such as batteries and gas tanks, which may cause ASR to exceed the above-mentioned standards. Auto shredders are required to conduct regular on-site visual self-inspections to ensure that all such materials are removed from the shredder feedstock. In addition, facilities are required to sample ASR for total petroleum hydrocarbons, metals, and PCBs in accordance with Department timetables and protocols.

If maximum contaminant levels are exceeded, the facility is required to institute an accelerated testing schedule and commence to treat, store, transport, and dispose of the ASR as hazardous waste. The facility may be required to cease shredding operations until the facility management and the Department can agree upon revised operating procedures which ensure that ASR will not exceed the maximum contaminant levels.

Wood Waste:

Wood wastes include stumps and brush. If handled properly, they may have beneficial uses. The preferred management options for wood waste is chipping and/or composting. Chipped wood wastes may be used for a variety of beneficial uses including as a mulch and as a bulking agent in the composting of sludge or other organic materials. In addition to chipping, DEP supports, through Chapter 584 grant and loan programs, innovative technologies for reuse of brush and stumps.

Chapter 7. CONCLUSION

Solid waste management has, in the last five years, emerged as perhaps the single most pressing environmental challenge facing our society. The public constituency calling for improved management of solid waste is large, diversified, and vocal. It is also effective. In only the last three years, dramatic steps have been taken to radically alter the Commonwealth's solid waste management practices. For example, the state's regulatory and permit authority has directed the closure of 40 single-community landfills and has permitted 7 regional facilities.

Today, landfilling is no longer a cheap, easy, or safe disposal option. Indeed the cost of constructing landfills with adequate environmental controls is competitive with combustion and it exceeds the price of recycling and composting. The shortage of environmentally-sound disposal capacity is currently being relieved through construction of processing facilities. In 1988, the state's MSW disposal capacity was almost equal to its generation rate. And this dynamic will continue in the short run. The Commonwealth recycled 130,000 more tons of its trash in 1988 than it did in 1985. Its permitted combustion capacity has increased by 1.8 million tons per year in that same time frame as well.

DEP faces a complicated challenge in designing and managing the State's solid waste management system. There are many concerns:

- o Strong support for recycling exists, but many are skeptical about whether a suitably-sized market for recyclables can be developed for the long term.
- o The pollution risks posed by current disposal methods have created a climate of uncertainty for municipal decision makers, regulators, and members of the solid waste disposal industry.
- o Despite the extensive amount of solid waste capacity provided by the Commonwealth's recycling and composting programs, eight combustion facilities, and about 200 active landfills, the safe disposal of appliances, construction debris, and other problem wastes poses an increasingly difficult challenge.

- o Illegal dumping is viewed by the citizenry as a worsening problem. The charge to enforce against this problem is complicated by limited resources and difficulty of cross-jurisdictional coordination.
- o Communities cannot keep up with the costs associated with solid waste management. The cost of proper closure of landfills is often considerably beyond the range of Proposition 2 1/2-constrained municipal budgets.

This report details DEP's action strategy for future management of solid waste. With additional development over the next months as a result of public input and further research, it will serve as the public guide to solid waste decision-making to the year 2000. It responds to the challenge of building a solid waste management system which puts the notion of the past -- of simple solutions -- behind us. This plan provides information on current conditions: where, how, and how much solid waste is handled and disposed; what authority and responsibility different parties have in this process; and why we experience difficulties in providing safe and adequate disposal. It presents a vision of regional facilities which are well run, benign, and extract as much value from the waste stream as is possible. The plan describes action: short-term, focused activities by DEP to relieve current problems; and long-term, to achieve the right mix of solid waste management solutions.

Issuance of these drafts spurs a dialogue intended to allow citizens, state and municipal officials, and interested groups, to take hold of the future by ensuring the most rational, environmentally sound, and cost-effective disposal of solid waste. Once completed, the master plan will guide DEP's allocation of more than a quarter billion dollars in capital authorized under the Solid Waste Act of 1987.

This draft will be subject to additional analysis and public review to ensure its ultimate usefulness. DEP work includes:

- o Improved accounting of the components and volume of solid waste generated in the Commonwealth;

- o Promulgation of updated and expanded solid waste facility regulations;
- o Articulation of proposed new integrated waste management-based criteria for MEPA review of solid waste facility proposals;
- o Further development of recycling policies: how DEP will work with communities and the private sector to ensure that a recycling infrastructure is constructed which furthers DEP's goal of promoting sustainable recycling at a fair and reasonable cost.
- o Conclusion to the assessment of the state's direction in allowing construction of combustion facilities. This will include analysis of facts, figures, and policy options. Specifically it will 1) analyze whether there is sufficient justification for increased burn capacity; 2) review existing public financial subsidy programs available to the solid waste industry; assess what advantage they provide to the resource recovery industry and if they can be restructured to better favor recycling and composting; 3) complete the process started with the new site assignment regulations which is to restructure the DSWM's solid waste regulations to accomplish integrated solid waste management goals; 4) explore additional policy, planning and regulatory tools which can be created or improved upon to help ensure success in realizing the Commonwealth's integrated waste management goal.
- o Research and development of standards to allow for safe recycling of problem wastes such as demolition debris and ash from combustion facilities
- o Initiate the process of comprehensive assessment of all landfills with high priority given to those sites known to be associated with the greatest threat to public health.

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Division of Solid Waste Management
Willa Small Kuh, Director
1 Winter Street, 4th Floor
Boston, MA 02108

Recyclable Material Markets
and
Waste Disposal Sites*

•Note: This is a partial listing of vendors who accept, collect or purchase recyclables and difficult-to-dispose-of wastes. This is not a complete resource list for the Commonwealth and does not represent an endorsement by DEQE. DEQE welcomes additions to either the material or vendor categories. *Please contact Susan Cascino at (617)292-5980 for information.*

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DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
ALUMINUM				
	Savransky (617)666-8941	56 Webster Ave. Somerville		
	Somerset Junk (617)623-9579	508 Columbia St. Somerville		
	Sugarman, Inc. (617)479-1637	299 Centre St. Quincy		
	Deposit cans	Recycling Enterprises (508)949-2797	Old Webster Road Oxford	M-F 7:00AM-3:30PM
	P. Allen & Son (413)584-3040	Edward Allen Easthampton Rd/Rt110 Northampton	M-F 6:30AM-3:30PM	Collects by truckload.
	Kramer Scrap, Inc. (413)774-3103	P.O. Box 588 Greenfield	M-F 8:00AM-4:00PM	
	Alco Recycling Company Cynthia Strong (201)225-9550	Raritan Center 100 Colver Place Edison, NJ		Collects by trailorload. Uses a flattener-blower.
ANTIFREEZE				
	40 BELOW Antifreeze Services (508)435-4044	112 South Street Hopkington	M-F 9:00AM-5:00PM	\$50 hauling fee No minimum amount require
ASPHALT BATCHING PLANTS				
	Brox Paving (508)454-9105	1471 Methuen St. Dracut	M-F 7:00AM-3:30PM Sat. 8:00AM-NOON	Accepts deliveries.

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't Asphalt Batching Plants				
	Simeone Corp.	Wrentham		
	(508)384-3161			
	CARDI	Route 95		
		Warwick, RI		
AUTOMOBILE PARTS DISPOSAL				
	Prospect Iron and Steel	40 Bennett Street		Must deliver
	(617)666-3405	Somerville	M-F 7:30AM-4:15PM	\$.02/lb.
Automobiles	Prolerizer New England			
	(617)389-8300	Everett		
Automobiles	J. P. Carroll	31 Allen	M-F 8:00AM-5:00PM	Charge: \$25 for cars
	(617)861-6060	Lexington	Sat. 9:00AM-3:00PM	delivered.
	Universal Salvage	299 Bridge Street	M-F 7:00AM-4:30PM	Must deliver.
	(617)744-0124	Salem	Sat. 7:00AM-11:30AM	Charge different rates
				for different parts.
Mufflers and fuel tanks	Tombrello's	207 Marston Rd	M-F 7:30AM-4:15PM	Must deliver.
	(617)675-7831	Lawrence	Sat. 7:30AM-11:45AM	
Automobiles	Tewksbury Auto			
	(508)851-5946			
	Day's Used Auto Parts	20 Rindge	M-F 8:00AM-5:00PM	Will tow.
	(508)756-2850	Millbury		
Cars and trucks	ML Norwood Auto Recycling	123 Adams Road	M-F 8:00AM-5:00PM	Will tow.
	(508)839-5934	N. Grafton		

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't Automobile Parts				
	National Auto Clearing House (508)754-4666	470 Franklin	M-F 8:00AM-5:00PM	Will tow.
	(508)791-2444	Worcester	call for appointment	Deliveries accepted.
	(508)791-0086			
	Patriot Metals (508)798-3333	Worcester		
	Kramer Scrap, Inc. (413)774-3103	P.O. Box 588 Greenfield	M-F 8:00AM-4:00PM	No collection. Will pay \$5/ton.
BATTERIES				
For each battery a distributor buys, s/he can return one to the manufacturer; consequently, most distributors will take old batteries from their customers.				
	Lenox Junk	1170 Mass. Ave Dorchester	M-F 7:00AM-4:30PM Sat. 7:00AM-Noon	Must deliver.
	P. Jacobson (617)666-8749	508 Columbia St. Somerville		
	Tewksbury Metals (508)851-5948	Danscomb Road Tewksbury	M-F 8:00AM-4:00PM	May collect. \$.50 per battery
	E. L. Harvey 1-800-321-3002	Route 135 Westboro	M-F 8:00AM-5:00PM Sat. 8:00AM-Noon	
	Goldstein Scrap Metal (508)754-5711	51 Harding Worcester	M-F 8:00AM-5:00PM Sat. 7:00AM-Noon	Deliveries accepted.
	Kramer Scrap, Inc. (413)774-3103	P.O. Box 588 Greenfield	M-F 8:00AM-4:00PM	
	General Battery Corp. (215)378-0500	Reading, PA		Collection in Mass can be arranged.

DEQE Recyclable Materials Markets

[illegible]

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
GLASS (glass colors include flint --which is clear, amber --which is brown, and green)				
amber and flint	Jet-A-Way (617)288-7131	125 Magazine Street Roxbury	M-F 7:30AM-4:30PM	
all colors	New England CRINC (617)667-0096	74 Salem Road North Billerica		30 miles.
all colors	North Atlantic Recycling Services Inc. (508)682-5442	1939 Turnpike Street North Andover		25 miles.
all colors and plate glass	David White (508)682-5442	1939 Turnpike St. North Andover	M-F 7:00AM-4:30PM	Supplies containers. Collects.
all colors	Redemco (508)584-8200	40 Ledin Drive Avon		25 miles Will collect.
clear and amber	Foster Forbes 478-2500	National Ave. Milford	Sat. 8:30AM-11:30AM	Charge: \$40/ton.
all colors & window glass	Recycling Enterprises (508)949-2797	Old Webster Road Oxford	M-F 7:00AM-3:30PM	50 miles. Accepts deliveries. 15 tons min. to haul.
all colors	Maine Beverage Container Services Henry Brown (207)774-0735	80 Rand Road Portland, ME 04102		110 miles*
clear and amber	Anchor Glass Container Corp. (203)774-9636	Dayville, CT		Charge: \$30/ton flint, \$10/ton amber.
				*Mileage indicates distance from Boston.

DEQE Recyclable Materials Markets

[illegible]

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
PAPER				
	high-grade paper:	computer print-out white ledger color paper		
	low-grade paper:	newspaper corrugated cardboard plain cardboard (boxboard) magazines mixed office paper		
	Activity: "b" - broker, "c" - collector, "p" - processor.			
all grades	Kemble Waste Company (617) 445-5758	27 Kemble Street Boston	M-F 7:30AM-3:00PM	p -- Will haul for industrial accounts.
all grades	Schirmer Paper Corp. 723-5588	1 Longfellow Place Boston		Accepts deliveries. b-- industry only Collect by appointment.
all grades	Paper Fibres Corporation (617) 445-3900	152 Hampden Roxbury	M-F 7:00AM-4:00PM	b,c,p Accepts deliveries.
all grades	Jet-A-Way 288-7131	Roxbury		b
all grades	Surgarman M & Co., Inc. 479-1637	299 Centre Quincy		p
all grades	Great Eastern Packing & Paper Stock Corp. (617) 337-9800	200 Libby Industrial Parkway Weymouth	By appointment	c,p--Collect by trailorload.
all grades	Spiegel S. Co. Inc. (508) 963-7757	175 E. Ashland Brockton	M-F 8:00AM-4:00PM	c,p Accepts deliveries.

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't PAPER all grades	Malden Waste Paper (617) 322-2337	1130 Eastern Ave. Malden	M-F 7:00AM-4:00PM Sat. 7:00AM-11:00AM	b,c,p-Collect by trailorload Accepts deliveries.
all grades	No. Shore Recycled Fibers (617) 289-9400	53 Jefferson Ave Salem	M-F 7:00AM-5:00PM	b,c,p. Collect 1/2 truckload Accepts deliveries.
all grades	Town Recycle 275-4518	North Road Bedford		c
all grades	American Paper Recycling Corp. (508) 339-5551	87 Central Mansfield		b,c,p Collects for 45' trailorload
all grades	Frank Miller & Son (508) 695-0211	435 Mount Hope St. North Attleboro	M-F 7:00AM-4:00PM Sat. 7:00AM-11:00AM	Will haul for industrial accounts. Accepts deliveries.
all grades	E. L. Harvey 1-800-321-3002	Route 135 Westborough	M-F 8:00AM-5:00PM Sat. 8:00AM-Noon	
all grades except newspaper.	Waste paper Corp. of Worcester County (508) 943-0727	Cudworth Road Webster	M-S 7:00AM-4:00PM	Collect by trailorload. Accepts deliveries.
all grades	P. Allen & Son (413) 584-3040	Edward Allen Easthampton Rd/Rt110 Northampton	M-F 6:30AM-3:30PM	Collects by trailorload.
all grades	Northeast Recycling Corp. (413) 736-7167	40 Napier Springfield		Municipal and commercial accounts only.
hi-grade paper	Earthworm, Inc. (6127) 426-7344	186 Lincoln St. Boston		c -- 500lbs. minimum.

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't PAPER				
hi-grades	Ginsberg, B. & Co. (617) 426-5698	64 E. Canton Street Boston	M-F 6:00AM-5:00PM Sat. 6:00Am-Noon	b,c,p Collects in certain locations. Accepts deliveries.
hi-grade	M & O Waste Company (617) 268-7585	89 Damrell South Boston		c
hi-grade paper	McGinnis Paper Recycling Company (617) 825-4677	75 Taylor Dorchester		c -- collect min. 1 ton.
hi grade paper	Paper Recycling Company (617) 442-0419	43 New Heath Roxbury		c
hi grade paper	Basic Waste Systems (617) 396-1177	15 Cooper St. Medford		b,c,p Collects in Boston & North Shore. Accepts deliveries.
hi grade paper	New Ocean Trading (617) 547-2300	15 Cooper Street Medford	By appointment.	b-- Collects in Boston & North Shore. Accepts deliveries.
hi grade paper	Capital Paper Recycling (617) 585-4901	42 Prospect Rd. Plympton	M-F 7:00AM-5:00PM Sat. 7:00AM-1:00PM	b,c,p Will haul & accepts deliveries.
hi grade	Hanna Paper Recycling, Inc. (617) 784-5155	1150 General Edwards Highway Sharon		c,p Will haul for industrial accounts.
high-grade	Arvco Computer David Settle, Kevin Lecuyer (617) 987-0186	Main Street Oxford	M-F 6:30AM-4:30PM Sat. by appointment	c,p Accepts deliveries.
newspaper	Boston Food Coop (617) 787-1417	449 Cambridge St. Allston	M-S 10:00AM-9:00PM Sun. Noon-9:00PM	

DEQE Recyclable Materials Markets

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DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
PLASTIC				
	PET (polyethylene terephthalate)			
	carbonated beverage containers.			
	HDPE (high density polyethylene)			
	milk jugs, liquid detergent, cooking and motor oil containers.			
	LDPE (low density polyethylene)			
	trash bags, grocery sacks, dry cleaning bags.			
	PVC (polyvinyl chloride)			
	construction products--vinyl siding, pipes, floors.			
	Polyolefins (include polypropylenes and polyethylenes)			
	PP (polypropylene)			
	furniture, rope, packaging.			
	PS (polystyrene)			
	trade name--Styrofoam.			
PET containers (beverage containers with deposit only).	New England CRINC	74 Salem Road		Will haul (supermarkets, redemption centers).
	(617) 667-0096	North Billerica		
Plastic scraps from manufacturers.	L. Fine & Company	148 Lynnfield Street	M-F 9:00AM-5:00PM	20 miles from Boston.
	(508) 532-2112	Peabody		Hauls by the truckload.
LDPE film, stretch wrap, PVC, low & medium density liner	Environmental Resins Ltd.	420 Northboro Road	By appointment	Accepts large quantities of baled plastic.
	(508) 562-7010	Marlborough		Located 30 mi. from Boston
	Mike Gonet			
Engineering Plastics (computer boxes, nylon electrical connectors, polycarbonate)	Plastic Resale Corp.	8 Elise Street		Accepts from commercial manufacturers--20,000 pounds minimum.
	(413) 562-7591	Westfield		

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't PLASTIC				
Polystyrene, Styrofoam waste	Plastics Again (508)840-1521 Tom Tomaszek	24 Jylek Road Leominster	M-F 8:00AM-4:30PM	Transport 200 miles. Accepts truckloads at dock. Provide pick-up service for source separation. Collects by truckload.
	P. Allen & Son (413)584-3040	Edward Allen Easthampton Rd/Rt110 Northampton	M-F 6:30AM-3:30PM	
All post-consumer plastic	Ingenuity/ Plastics Recovery (203)785-0458	New Haven, CT		Will collect.
	Nyconn (718)392-1177	4-11 47th Ave New York, NY 11101		200 miles
Broker with plans to become processor in 1989 for PVC and Polyolefins.	Petroco (212)629-4500 (212)629-4500	1 Penn Plaza Suite 3424 New York, NY 10019		200 miles
Pre- & Post-consumer plastic Polyolefins, Polystyrene PVC, and PET.	R2B2 (Resource Recovery Bronx 2000) (212)731-3931	1809 Carter Ave. Bronx, NY 10457	M-F 8:00AM-5:00PM	180 miles Buy-back center.
	Star Plastics Inc. (518)459-1080	136 Fuller Road Albany, NY 12205		170 miles
HDPE containers	Eaglebrook East Plastics Inc. (914)344-1244	64 Genuing St. Middletown, NY 10940	M-F 8:00AM-4:30PM	Accepts Deliveries. Hauls by the truckload.
Water, soda, milk, and cooking oil plastic bottle (food stuff plastic bottles).	Rutgers, The Center for Plastics Recycling Research (201)932-2127	Process Development Division Building 4109 Kilmer Campus New Brunswick, NJ 08903		250 miles Large quantities received by appointment. Small quantities accepted 24hrs.

DEQE Recyclable Materials Markets

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DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
SCRAP METAL				
	Ferrous:	Non-ferrous:		
	Steel	Aluminum		
	Cast-iron	Copper		
	Tin cans	Lead		
		Brass		
non-ferrous	Burstein, M & Co., Inc. (617) 884-7700	40 Gerrish Ave Chelsea	M-F 6:30AM-5:00PM Call for an appointment	Will haul, one ton minimum.
ferrous-iron and steel	H. Cohen & Sons (617) 542-3300 (617) 268-6050	527 Dorchester Ave. South Boston	M-F 7:00AM-4:00PM	Accepts large quantities.
non-ferrous	Castle Metal Co. (617) 482-7332	464 Albany Street Boston		
non-ferrous	General Metals and Smelting (617) 442-2050	47 Topeka Street Roxbury	M-F 8:00AM-5:00PM	
non-ferrous	M. Kaplan & Co. (617) 389-4775	431 Second Street Everett	M-F 7:30AM-4:30PM	Must deliver.
non-ferrous	Kemble Waste Company (617) 445-5758	27 Kemble Street Roxbury		
non-ferrous	Lenox Junk (617) 288-2841	1170 Mass. Ave Dorchester	M-F 7:00AM-4:30PM Sat. 7:00AM-Noon	Must deliver.
non-ferrous	Philip Lewis & Sons (617) 442-1250	90 Kemble St. Dorchester	M-F 7:00AM-4:30PM Sat. 7:00AM-Noon	

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't SCRAP METAL				
Ferrous and non-ferrous	Prospect Iron and Steel (617)666-3405	40 Bennet Street Somerville	M-F 7:00AM-4:30PM	
non-ferrous metals, copper brass, lead, stainless, aluminum.	Atlas Junk (617)666-8440	475 Columbia Road Somerville	M-F 7:00AM-5:00PM Sat. 7:00AM-3:00PM	
copper, brass, aluminum	Bokser's Junk Shop (617)395-8810	20 Locust Street Medford	M-F 8:00AM-5:00PM Sat. 8:00AM-1:30PM	
	NE Environmental Services Company			
		5 Brook Street Westwood		
scrap iron and metals	Brockton Iron & Steel Co. David Stone (617)586-4640	45 Freight Street Brockton		
Heavy metals--#1, #2; non-ferrous metals	Highway Metals Recycling Kent Gagnon (508)947-8316	2 Freetown Street Lakeville		
	Salitsky Alloys Inc. (508)824-5425	18-20 Dana Taunton		
Ferrous and non-ferrous scrap.	Mid City Scrap (508)675-7831	Westport	M-F 7:00AM-4:30PM Sat. 7:00AM-NOON	Collection subject to quantity and quality. Delivery by appointment.
	Frank Miller & Son (508)695-0211	435 Mount Hope St. North Attleboro	M-F 7:00AM-4:00PM Sat. 7:00AM-11:00AM	Will haul for industrial accounts. Accepts deliveries.
	Champagne Auto Exchange (508)832-6669	355 Rochdale Auburn		

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't SCRAP METAL				
Number 1 Iron only,	Day's Used Auto Parts (508)756-2850	20 Rindge Millbury	M-F 8:00AM-5:00PM	
	Turner Trucking & Salvage	Hudson		
	Amber Scrap Trading Corp. (508)799-4238	546 Southbridge Worcester	M-F 7:00AM-4:00PM	
	Balcewicz Trucking & Salvage (508)757-3523	2 Langdon Worcester		
	Bay State Scrap (508)753-3926	8 New Street Worcester	Call for an appointment.	
	Consolidated Smelting & Refining (508)865-9201	Harback Rd Sutton		Buy from scrap metal dealers only.
	B.S. Cotton Company	63 Winter Street Worcester		
Non-ferrous	Empire Scrap Metals, Inc. (508)752-7750	35 Herman St. Worcester	M-F 7:45AM-5:00PM Sat. 7:45AM-Noon	Hauls for industrial accounts Will buy large quantities.
	Faulkner Scrap Metal (508)791-4802	9 Weldon Ave. Worcester		
	Goldstein Scrap Metal (508)754-5711	51 Harding Worcester	M-F 8:00AM-5:00PM Sat. 8:00AM-Noon	Will haul for industrial accounts. Deliveries accepted.

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't Scrap Metal	Jackson Metal & Scrap Co. (508)856-9425	41 Barbara Ave Worcester		Deliveries are not accepted. Will collect truck-load minimum.
Non-ferrous metal	Leroy & Co., Inc. (508)791-4802	567 Franklin Worcester		
	Lundstrom Otto Inc. (508)756-6405	22 Poland Worcester		
	Reisner, WM Corp (508)365-4585	33 Elm St. Clinton		Will haul for industrial accounts. Deliveries accepted.
Heavy steel	Patriot Metals (508)798-3333	30 Ballard Street Worcester	M-F 8:00AM-3:30PM	Deliveries accepted.
Aluminum Siding, wiring, (any metal that doesn't hold a magnet).	Starr Scrap Metal, Inc. (508)791-0086	753 Millbury Worcester	M-F 8:00AM-5:00PM Sat. 8:00AM-Noon	Deliveries accepted. Will haul large quantities.
Heavy metal.	Steel Searing & Baling Corp. (508)799-2133	546 Southbridge Worcester		Will haul for industrial accounts.
Nickel, Colbalt, Titanium based metals.	Universal Metal Corp. (508)754-6841	345 Shrewsbury Worcester		Industrial accounts only. Will haul certain materials.
Copper Wire	Wire and Metal Separation Systems Inc. (508)759-5070 (508)799-2133	542 Southbridge Worcester		
Ferrous and non-ferrous scrap.	R&R Industries (413)733-2118	195 Rocus Street Springfield	M-F 8:00AM-4:30PM	Will collect large quantities in dump trailers.

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't Scrap Metal				
	Kramer Scrap, Inc. (413) 774-3103	P.O. Box 588 Greenfield	M-F 8:00AM-4:00PM	
	J. Broomfield & Sons Scrap Metal (401) 785-2040	473 Allens Lane Providence, RI		
	AMG Resource (412) 331-0770 Roger Friend	4100 Grand Ave. Pittsburg, PA		
MASS. APPROVED UNDERGROUND STEEL STORAGE TANK DISMANTLING YARDS				
	O.R. Cole Company 556 St. James Ave Springfield	Mass. Tank Disposal Baskin Drive Chicopee	Associated Building Wrecking, Inc. 352 Albany Street Springfield	
	John C. Tombarello & Sons 207 Marston Street Lawrence	James G. Grant Co. R 28 Wolcott St. Readville (Boston)		
	State Line Scrap Co. Bacon Street So. Attleboro	A.W. Martin, Inc. 1080 Shawmut Ave. New Bedford		
STUMPS/WOOD WASTE				
Wood chips, mulch	Arthur Schofield, Inc.	1245 Worcester Rd Natick	M-F 7:00AM-4:30PM Sat. 7:00AM-NOON	Deliver by appointment.
Wood and yard waste, No stumps	Recycled Wood Products (617) 933-3883	25 Atlantic Ave Woburn	M-F 7:00AM-5:00PM Sat. 7:00AM-Noon	Must deliver.
Stump grinder	Kingston Industrial (617) 585-6531	Route 3, Exit 8 Kingston	M-F 6:00AM-3:30PM	Deliveries accepted. Will collect trailer-load

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't STUMPS/WOOD WASTE				
Mobile shredder (for stumps)	Vernon resource Systems (508)947-4711	Middleboro		Transport shredder to site. Will shred large stumps.
Landscape waste	Browning Ferris, Inc. (617)678-8860	Fall River Landfill 1080 Airport Road Fall River	M-F 7:00AM-3:30PM Sat. 7:00AM-11:30AM	Deliveries accepted with BFI's approval.
	Stump Eat'r, Inc. (413)589-7800	396 West Street Ludlow	M-F 6:00AM-5:00PM	
Stump grinder	Brox Paving (508)454-9105	1471 Methuen St. Dracut	M-F 7:00AM-3:30PM Sat. 8:00AM-NOON	Accepts deliveries.
	Advanced Stump (603)382-6292	97 S. Mains Street Newton, NH		
Trash, demolition	Jolly Farmer (603)863-8811 (800)535-0031	East Lempert, NH	M-F 8:00AM-5:30PM	Will collect by trailer load.
Wood waste, stumps, pallets (no treated wood or roofing).	Granite State Natural Products, Inc. (603)893-2561 Cheryl Breton	51 Main Street Salem, NH	M-F 7:00AM-5:00PM Sat. by appointment	Accepts deliveries.
	Continental Biomass Industries (603)893-9889	Salem, NH		
Clean wood waste, no stumps	FTI, Ltd. (207)783-2941 (508)649-6691	310 Cottage Rd Lewiston, ME	M-F 7:00AM-5:00PM Sat. by appointment	Minimum 100 yards for collection.
Wood burning plant	Alenag, Inc (207)246-4672	P.O. Box 347 Stratton, ME		Will transport.

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
TIRES				
Tire shredding companies will pick up large quantities or take a portable shredder to the location.				
	Boston Used Tire Removal (617)767-5138	50 Lake View Ave Holbrook		Will Collect min. 30 tires.
	Oxford Tire (617)769-4760	1801 Main Street Walpole		
	Vernon Resource Systems, Inc. (508)947-4711	Middleboro		Will bring shredder to site for a min. of 3000 tires.
	Main Line Tires (508)995-0690	283 Middle Road Acushnet		Charges: \$1--car tire, \$2--with rims.
	F&B Enterprises, Inc. (508)999-4124	43 Washburn Street New Bedford	M-F 8:00AM-5:00PM Sat. 8:00AM-Noon	Charges: \$.50--car tire, \$1--truck tire, \$2--truck radial.
	Bob's Tire Company (508)997-8545	29 Brook St. New Bedford		
	Roland's Tire Service (508)997-4501	11 Howland Road Fairhaven		
	Francis Belanger (603)878-3600	New Ipswich, NH		
	Tire Recycling (203)242-6251	40 E. Dudley Twn Rd. Bloomfield, CT	M-F 7:00AM-4:30PM	
	The Tire Pond (203)288-5604	North Haven, CT		

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
USED OIL				
Massachusetts General Law Chapter 21, Sec. 52A, requires that motor oil retailers accept used oil from customers presenting proof of purchase. A retailer is obliged to accept--free of charge--up to 2 gallons per day per customer.				
	A&A Waste Oil (617)899-3343	307 Warren Street Waltham		
	Pierce Brothers Oil Service (617)894-0251	329 Waverly Oaks Road Waltham		
	Bill Murphy's Waste Oil (617)933-4928	252 Salem Street Woburn	Sat. 8:00AM-Noon accepts household waste oil.	
	Murphy's Waste Oil Service Inc. (617)272-4211	15 Harriet Ave. Burlington		
	Fleet Preventive Maintenance, Inc. (508) 669-6963	223 Chace Ave Dighton		
Used oil from public agencies only (\$.38/gallon tank).	Dennison Waste Oil (617)294-0453	1057 Main Street Hanson	M-F 7:00Am-5:00PM	Will collect.
Used oil from municipalities	Mayflower Salvage Co. (508)822-7949	590 South Street Raynham		
	McDonald & Watson (401)946-0200	Pole 12, Green Hill Drive Johnston, RI		
	American Waste Oil (401)861-6243	551 Weeden Street Pawtucket, RI		

DEQE Recyclable Materials Markets

MATERIAL DESCRIPTION	VENDOR	LOCATION	HOURS OF OPERATION	TRANSPORT
Con't Used Oil				
	East Bay Waste Oil Co. (401) 246-0690	100 Arlington Ave. Warren, RI		
	Connecticut Waste Oil, Inc. (203) 235-8889	Meriden, CT		
	Merrill Transportation Co. (207) 797-7611	1037 Forrest Ave. Portland, ME		
WHITE GOODS (refrigerators, freezers, dryers, etc.)				
	Turner Trucking and Salvage (508) 586-4640	Hudson		
	Trolla & Son Rubbish Removal (508) 798-2271	Worcester		
	Brockton Iron & Steel Co. (508) 586-4640	45 Freight St. Brockton		
	David Stone			
	Kramer Scrap, Inc. (413) 774-3103	P.O. Box 588 Greenfield	M-F 8:00AM-4:00PM	
WOOL-COTTON				
Nylon	Burlon Waste Corporation (508) 753-3548	90 Ellsworth Worcester, MA		
	Dubin Wool Stock Company (508) 755-4335	Worcester, MA		Broker

DEQE Recyclable Materials Markets

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DEQE Waste Disposal Sites

ASBESTOS LANDFILLS STATE	SITE	TELEPHONE		
Massachusetts	BFI - Ahearn Landfill 845 Burnett Rd. Chicopee, MA	(413) 592-9411		
	J.F. Parlyka Landfill New Lombard Road Chicopee, MA	(413) 785-8226		
Maine	Consolidated Waste Service Inc. Airport Road Norridgewock, ME	(207) 634-2714		
	Sawyer Environmental Recovery Emerson Mill Road Hampton, ME	(207) 862-4200		
Connecticut	Groton Landfill Groton, CT	(203) 572-0198		
	Norcap Landfill Windsorville Road East Windsor, CT	(203) 627-9710		
	Sanitary Refuse Company Perret Place Manchester, CT	(203) 643-8545		
	Waterbury Landfill Waterbury, CT	(203) 575-1677		
New York	CID Landfill, Inc. 1329 Hand Road Chaffee, NY	(716) 496-5514		

DEQE Waste Disposal Sites

Con't ASBESTOS LANDFILLS		SITE	TELEPHONE		
STATE	TOWN				
Con't New York		Modern Landfill	(716) 754-8226		
		Model City, NY			
		Niagara Recycling, Inc.			
		Niagara Falls, NY			
COMMERCIAL LANDFILL SITES					
			OPERATOR		
	Attleboro	Attleboro Landfill	Albert Dumont		
		Peckham Street	(508) 222-7454		
		Attleboro			
	Barre	Resource Control, Inc.	Robert Foley		
		Valley Rd./ Worcester Rd.	(508) 355-2861		
		Depot			
		Barre			
	Bridgewater	Chuckran Corp. Landfill	Paul Chukran		
		Colonial Dr./Rte. 18	(508) 697-4468		
		Bedford			
	Chicopee	RFI - Ahearn Landfill	Private		
		845 Burnett SRd.			
		Chicopee			
		(413) 592-9411			
	Chicopee	Parlyka Management Co.			
		Lombard Road			
		Chicopee			
		(413) 785-1581			
	Chicopee	Chicopee Sanitary Landfill	Private		
		645 Shawningan Drive			
		Chicopee			

DEQE Waste Disposal Sites

Con't COMMERCIAL LANDFILL SITES				
TOWN	SITE	OPERATOR		
East Bridgewater	Northern Disposal, Inc.	private		
	234 Thatcher			
	Rich McEwen			
	(508) 588-2260			
Fall River	Fall River Landfill			
	1080 Airport Road			
	Rich McEwen			
	(508) 678-8860			
Granby	Partyka Granby Landfill	Partyka		
	New Ludlow Rd./Rte 122 Granby			
Great Barrington	Mercer Landfill	Fred Mercer		
	Rte. 7/Sheffield Rd. Great Barrington	(413) 528-9315		
Halifax	RFI Landfill Inc.	Mark Lyons		
	27 Laurel St. Halifax	(617) 265-9595		
Hardwick	Hardwick Landfill	Private		
	Patrill Hollow Hardwick			
Haverhill	Ogden Martin Landfill	Ogden Martin		
	Ward Hill/Neck Road Haverhill			

DEQE Waste Disposal Sites

COMMERCIAL TRANSFER STATIONS		SITE		OPERATOR		OWNER	
TOWN							
Ashfield		Ashfield Transfer Station		Town of Ashfield		Commercial Disposal	
		Rte. 112					
		Ashfield					
Boston		Laidlaw Transfer Station		Laidlaw		Laidlaw	
		66 Norfolk Ave.		(617) 445-8383			
		Roxbury					
Roston		Jet-A-Way Transfer Sta.		Jet-A-Way		Jet-A-Way	
		31-47 Kembee Street		(617) 233-7131			
		Roxbury					
Bridgewater		Convenience Area		MacDonald Industries, Inc.			
		Off Route 106		14 Elm St./Box 431			
		Bridgewater		Allan MacDonald			
				(617) 697-5200			
Cambridge		BFI Transfer Station		Browning Ferris Industries			
		29 East Street		Steve Dunn			
		Cambridge		(617) 265-0500			
Chesterfield		Chsterfield Trans. Station		Hatch Company			
		Willicut Rd./Main Rd		343 South Main St.			
		Wood-Bersh		Monson			
		Chesterfeild		Robert Paine			
		(413) 296-3547		(413) 296-4207			
Danvers		Danvers Transfer Station		Ogden Martin Systems			
		Popes Lane/East Coast		100 Recovery Way			
		Danvers, MA 01923		Haverhill			
		(508) 372-6288					

DEQE Waste Disposal Sites

Con't COMMERCIAL TRANSFER STATIONS				
TOWN	SITE	OPERATOR		
Holliston	Holliston Transfer Station	Private		
	115 Washington St. (508) 265-9595			
Leominster	Leominster Transfer Sta. Jungle Road	Ogden Martin Systems Ward Hill Industrial Park Bradford Tom White		
	Leominster (508) 372-6255			
Marlborough	Post Rd. Trans. & Recovery Boston Post Road-East Marlborough	Donald Wright (508) 481-0365		
	(508) 481-0336			
Millbury	Millbury Trans. Sta. Route 20 Millbury	Wheelabrator Systems, Inc. P.O. Box 740/331 SW Cutoff Rd. Millbury (508) 791-8900		
Newburyport	Marcellos Transfer Sta. Crow Lane Newburyport	Marcellos		
Newton	Newton Transfer Sta. 121 Rumford Ave. Newton	Laidlaw Waste Systems 121 Rumford Ave Newton (617) 969-2882		
Peabody	Regional Waste Systems 297 Forest Street Peabody	Mark Paulino		
	(508) 531-8700			

DEQE Waste Disposal Sites

Con'l COMMERCIAL TRANSFER STATIONS				
TOWN	SITE	OPERATOR		
Somerville	ORFA Transfer Station			
	Msg. O'Brien Highway			
	Somerville			
Stockbridge	Town's Highway Garage	Town of Stockbridge		
	West Stockbridge Rd.			
	Route 102			
	Stockbridge (413)298-4714			
Upton	Upton Fuel & Construction	Henry Poirier		
	Maple Ave.			
	Upton (508)529-7761			
Washington	Washington Transfer Sta.	Town of Washington		
	Route B	Stone House Rd.		
	Washington	Washington		
	(413)623-5233	Robert Jarvis		
Westborough	Westborough Transfer Sta.	E.L. Harvey & Sons		
	Hopkinton Road	120 South Street		
	Westborough	Westborough		
	(508)366-4123	(508)366-4123		

DEQE Waste Disposal Sites

SOLID WASTE COMBUSTION FACILITIES				
TOWN	SITE			CONTACT
NORTHEAST				
Framingham	Framingham Municipal Incinerator			James Hanscon Director of Public Works (617)620-4900
Haverhill	Ogden Haverhill Associates Resource Recovery Facility (508)372-6288			Frank Johnson Dept. of Public Works (508)684-4759
North Andover	Wheelabrator Environmental Systems Resource Recovery Facility Holt Road North Andover (508)688-9011			Jerry Hopcroft NESWC (508)686-6234
Saugus	Wheelabrator Environmental Systems Resource Recovery Facility Rte. 107 Saugus			Dan Madigan (617)233-7600
SOUTHEAST				
Fall River	Fall River Municipal Incinerator Lewiston Street Fall River			Ron Costa (508)675-6011
Rochester	SEMASS Corporation Route 23 Rochester			John Baynard (508)295-6368
CENTRAL	Wheelabrator Environmental Systems, Inc. Resource Recovery Facility Route 20 Millbury			John O'Sullivan (508)791-8900

DEQE Waste Disposal Sites

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APPENDIX 2:

DERIVATION OF MSW GENERATION RATES

The methodology used by DEP to derive solid waste generation numbers for the years 1988, 1992, 1996, and 2000 in this document are volume estimates for MSW and do not account for any difficult-to-dispose wastes or industrial wastes. The MSW generation rate is calculated by adding the residential and commercial rates. These two rates are calculated on a per capita basis. Experience has shown that generation rates fluctuate with the population size of a community. For this reason a discussion of all three components follows:

Population Rates

The Massachusetts Institute for Social and Economic Research (MISER) at the University of Massachusetts (UMA) devised methodologies for projecting population, on a municipality by municipality basis, in Massachusetts for the years 1986, 1990 and 1995 which is based on actual data from the 1985 State Census. DSWM has taken this information and projected the municipal populations for 1988, 1992, 1996 and 2000.

The methodology used in projecting these figures was based on interpolation, (calculating the difference between two known points, dividing by the number of periods to arrive at the difference per period; then multiplying the difference by the number of periods from one known point to the point for which you are calculating and then adding to the same known point).

EXAMPLE:

$$1988 \text{ population} = 2 [(1990 \text{ Pop} - 1986 \text{ Pop}) / 4] + 1986 \text{ pop}$$

where: 1990 and 1986 are the two known points;
4 is the number of periods between the
two known points; 2 is the difference
from 1986 to 1988; 1986 is the base
year from which we are calculating.

The figures for the other years 1992, 1996, and 2000 were similarly calculated.

While this methodology was used to project the populations for most communities, an equivalent annual population (EAP) was calculated for areas subject to dramatic seasonal changes. Population projections were then derived based on winter/summer population figures by calculating the percentage change.

$$EAP = WP + 100 / 365 \times (SP - WP)$$

EAP = Equalized Annual Population

WP = Winter Population

SP = Summer Population

Commercial Solid Waste Generation Rates

Commercial solid waste generation estimates vary with the size of the population of a community. Larger and more populous municipalities have proportionately more manufacturing, service and trade industries in comparison to smaller municipalities.

The per capita rates were devised by The Bureau of Solid Waste Disposal in 1985. These estimates are approximations based on survey estimates reported through the Central Massachusetts Resource Recovery Project by the Mitre Corporation (May 1980), and in the Norfolk County Comprehensive Solid Waste Management Study by Camp, Dresser & McKee (July 1974). Estimates from these reports were divided by each municipality's projected population for the year in question. This formula resulted in a generation rate calculated in tons per person per year for commercial waste.

Both reports contain waste composition studies that were used as a guideline for developing the per capita commercial generation rates listed below. DEP is currently contracted for new waste composition surveys.

POPULATION GROUPS	COMMERCIAL GENERATION RATE
0 - 20,000	0.35 tons/person/year
20 - 40,000	0.50 tons/person/year
40 - 100,000	0.65 tons/person/year
> 100,000	0.80 tons/person/year

Residential Solid Waste Generation Rates

DSWM compiled a list of municipalities contracting with solid waste combustion facilities along with the amount of municipal solid waste which each had delivered to their respective facility during 1988. It was assumed that only residential waste was delivered. Because of the accuracy of the

weighing data, this information served as the basis for calculating MSW generation rates. Each municipality's total tonnage delivered in 1988 (residential waste stream) was divided by the projected population for 1988 to determine the generation rate in tons per person per year for residential waste for those communities. Then the communities were categorized based on their population into one of the four population groups. The residential rates for the various groups were then averaged to determine a rate for each population group.

A compilation of these residential generation rates produced varying amounts from 0.3 to 0.65 tons per person per year. Interestingly, these rates showed that, unlike commercial rates, residential rates did not increase steadily as population increased--as might be expected. The deciding factor in the rate of residential generation seems to be leaves and yard wastes. The smallest communities in the State tend to be more rural and thus throw away fewer leaves -- generally they are disposed on the property. Slightly larger rural and average size rural and urban communities showed rates that seemed to increase as population increased. Large urban communities show a drop in rate because there are many fewer, if any, leaves disposed in these areas.

Average generation rates were calculated based on the municipalities population and are grouped below accordingly.

POPULATION GROUPS	RESIDENTIAL GEN RATE
0 - 20,000	0.567 tons/person/year
20 - 40,000	0.600 tons/person/year
40 - 100,000	0.650 tons/person/year
> 100,000	0.380 tons/person/year

Total Municipal Solid Waste Generation

Add the commercial tonnage to the previously determined municipal tonnage to determine the total town's municipal solid waste generated.



